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Environmental Standards for Coal Conversion Processes. Volume II Selected State, Mexican, and Canadian Regulations

Pullman Kellogg, Houston, TX

Prepared for

Industrial Environmental Research Lab., Research Triangle Park, NC

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Industrial Environmental Research
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Environmental Standards for Coal Conversion Processes. Volume II. Selected State, Mexican, and Canadian Regulations

Interagency Energy/Environment R&D Program Report

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The report synopsizes existing and proposed environmental standards as a guide for evaluating the efficiency of available and developing technology for controlling liquid, gaseous, and solid wastes from coal conversion processes. Within the U.S., the Federal (including EPA) standards and guidelines for air, water, and solid wastes were gathered, together with standards for 22 states (selected for their potential in installing coal conversion facilities) and two regional commissions. Because environmental effects can cross national borders, standards and guidelines for Mexico, the Dominion of Canada, two Canadian provinces, and the International Joint Commission of U.S. and Canada were synopsized and added to the U.S. standards. All standards and guidelines were compared; from them the most stringent standards were summarized. This summary, reduced as far as possible to engineering terms, can guide in the design of coal conversion plants on the premise that if wastes from the conversion process steps are treated so that the final releases to the environment meet the criteria of most stringent standards, then conversion plants can be built anywhere in the U.S., Mexico, or Canada.

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Foreword

The intent of this report is to provide those working in the engineering areas of multimedia environmental control an awareness of the types and breadth of regulations and criteria that have been and will be implemented. The information contains an engineering interpretation of some of the more stringent standards in the U. S., Canada, and Mexico. This is intended to aid process designers in their efforts to design environmentally improved facilities. The information is not intended to be a definitive summary or an exhaustive listing. Nor, is the report able to reflect accurately the current status of regulations because of on-going additions or changes.

The reader must constantly be aware that this text will have the above limitations, and due to summarization may not always reflect the true intent of specific regulations.

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ABSTRACT

Existing and proposed environmental standards have been gathered and synopsized to serve as a guide for evaluation of the efficiency of available and developing technology for control of liquid effluents, gaseous emissions and solid wastes from coal conversion processes. Within the United States, the Federal and EPA standards and guidelines for air, water and solid wastes were gathered, together with the standards for 22 states selected for their potential in installation of coal conversion facilities and the standards for two regional commissions. With a view toward the possibility of environmental effects crossing national borders, the standards and guidelines for Mexico, the Dominion of Canada, two Canadian provinces and the International Joint Commission of U.S. and Canada, were synopsized and added to the U.S. standards.

All of the standards and guidelines were compared and from them a summary of the most stringent of the standards was developed. This summarization, reduced as far as possible to engineering terms, can serve as a guide in the design of coal conversion plants on the premise that if the effluents, emissions and wastes from the conversion process steps are so treated that the final releases to the environment meet the criteria in the summary of most stringent standards, then the conversion plants can be built anywhere in the U.S., Mexico or Canada.

NEW MEXICO WATER QUALITY

Basis: New Mexico Water Quality Standards (August 1973)

Agency: New Mexico Water Quality Control Commission

Note: 1. The following water quality criteria represents the most stringent provisions as specified for the water use classification. By restricting effluent emissions such that they will not cause the receiving water to exceed the standards shown should satisfy any of the water quality standards.

2 New Mexico establishes primary effluent limitation restrictions by the use of permits to discharge where the effluent criteria are specified as a condition of the permit. The effluent limitations shown in II below do not apply to any discharge which is subject to a permit under the National Pollutant Discharge Elimination System.

3. The following general standards which are applicable to all state waters and provide no definite design criteria other than what is recognized and necessary to avoid the conditions prohibition by the general standards.

I. GENERAL STANDARDS APPLICABLE TO ALL WATERS OF THE STATE

A. The receiving water shall be free of:

1. Contaminants that will settle and adversely alter the physical and chemical properties of the bottom.

2. Objectionable oils, scum, grease and other floating material resulting from other than natural causes.

3. Color producing materials, other than natural causes, which would create an esthetically undesirable condition.

B. Water contaminants from other than natural causes shall be limited to concentrations that will not result in offensive odor or impart an undesirable flavor to fish.

C. Toxic and Hazardous Substances

1. Toxic substances such as, but not limited, to heavy metals and organics shall not be present to an extent detrimental to human or other organisms.

NEW MEXICO WATER QUALITY

I. GENERAL STANDARDS APPLICABLE TO ALL WATERS OF THE STATE (CONTD.)

2. Waters used for drinking water supplies shall be protected from hazardous substances in amounts which exceed the U. S. Public Health Service Drinking Water Standards.

D. Temperature

1. The introduction of heat by other than natural causes shall not increase the temperature by more than 5°F (2.7°C) in a stream, or more than 3°F (1.7°C) in a lake or reservoir.

E. Turbidity

1. Turbidity attributable to other than natural causes shall not reduce light transmission to the point that desirable aquatic life is inhibited.

F. Dissolved Gases

1. Surface waters shall be free of nitrogen and other dissolved gases at levels above 110% saturation when this is attributable to industrial or other discharges.

G. Radioactivity

1. The radioactivity of surface waters shall be maintained at the lowest practical level and shall in no case exceed the standards set forth in the New Mexico Environmental Improvement Board Radiation Protection Regulations, adopted June 16, 1973.

II. EFFLUENT LIMITATION

Note: As indicated in note 2 above these requirements shall not apply to any discharge which is subject to a Nation Pollutant Discharge Elimination System (NPDES) permit.

A. General Requirements:

	Substance	Limitations
1.	BOD (Bio-Chemical Oxygen Demand)	≤ 30 mg/l
2.	COD (Chemical Oxygen Demand)	≤ 125 mg/l
3.	Settleable Solids	≤ 0.5 mg/l

II. EFFLUENT LIMITATION (CONTD.)

	Substance	Limitations
4.	Fecal Coliform Bacteria	500/100 ml
5.	pH (range)*	6.6 - 8.6

*The Director of the Environmental Improvement Agency may eliminate the pH requirement for any effluent source which is determined to not unreasonably degrade the water into which the effluent is discharged.

B. Sampling

Samples shall be examined in accordance with the most current edition of Standard Methods for the Examination of Water and Wastewater published by the American Public Health Association or the most current edition of Methods for Chemical Analysis of Water and Waste published by the Environmental Protection Agency, where applicable.

III. REGULATION FOR DISCHARGES ONTO OR BELOW THE SURFACE OF THE GROUND

A. Ground Water Standards for Groundwater of 10,000 mg/l TDS Concentration or Less.

Substance	Limitation (maximum)
Arsenic (As)	0.05 mg/l
Barium (Ba)	1.0 mg/l
Cadmium (Cd)	0.01 mg/l
Chromium (Cr)	0.05 mg/l
Cyanide (CN)	0.20 mg/l
Flouride (F)	1.70 mg/l
Lead (Pb)	0.05 mg/l
Total Mercury (Ag)	0.002 mg/l
Nitrate (NO_3 as N)	10.00 mg/l
Phenols	0.005 mg/l
Selenium (Se)	0.01 mg/l
Silver (Ag)	0.05 mg/l
Sulfate (SO_4)	600.0 mg/l
Uranium (U)	5.0 mg/l
Organic Chemicals (carbon Chloroform Extract Method)	0.7 mg/l
Chloride (Cl)	250.0 mg/l
Copper (Cu)	1.0 mg/l
Iron (Fe)	0.30 mg/l

III. REGULATION FOR DISCHARGES ONTO OR BELOW THE SURFACE OF THE GROUND (CONTD.)

Substance	Limitation (maximum)
Manganese (Mu)	0.20 mg/l
Total Dissolved Solids (TDS)	1000.0 mg/l
Zinc (Zn)	5.0 mg/l
pH	6 - 9

Notes: 1. If the existing concentration of any water contaminant in ground water is in conformance with the standards above; degradation of the ground water up to the limit of the standard will be allowed.

B. Discharge Plan Required

1. Effluent discharge plan must be approved by the Director and discharges must be consistant with the terms and conditions of the plan. This is applicable to effluent or leachate discharged onto or below the surface of the ground.

2. Exemptions

   a. Effluent or leachate which conforms to all above listed numercial standards and has a total nitrogen concentration of 10 mg/l or less.

   b. Effluent which is discharged to a watercourse which is naturally perennial.

   c. Leachate from solids disposed of in accordance with the Solid Waste Management Regulations adopted by the New Mexico Environmental Improvement Board.

NEW MEXICO: STANDARDS OF PERFORMANCE FOR STATIONARY SOURCES

Agency: Environmental Improvement Agency

I. General Provisions

A. Definitions

1. "Fugitive dust" means solid airborne particulate matter emitted as a result of the processing operation from any source, including waste piles, other than a flue.

2. "Gasification plant" means a plant that manufactures synthetic gas and includes: all process gas streams and products produced in the gasification process; all operations associated with treatment of gasification products; ash removal equipment; regeneration of any absorbent or oxidizing agents (and any off gases so produced) used in the treatment or removal of products produced in the gasification process; catalyst regeneration; storage facilities for liquids, solids and gases; and pretreatment of coal. Gasification plant does not include the coal preparation plant, the sizing and briqueting of coal or any process gas streams after the streams enter a boiler and undergo combustion.

3. "Particulate matter" means any airborne material except uncombined water which is often, but not always, suspended in air or other gases at atmospheric temperature and pressure.

4. "Petroleum processing facility" means any petroleum refinery or natural gas processing plant. It does not include tank batteries, separators, heater-treaters or field compressors.

5. "Petroleum refinery" means a petroleum refinery or part thereof, and includes all vessels, boilers, heaters, condensers, cracking units, sweetening units, regenerating units, sour water strippers, wastewater separators, storage and loading facilities, sulfur recovery facilities, flares and other facilities inter-connected in their processing operations and used in the processing of crude oil, condensate, pentanes, butanes or similar substances for the purpose of producing gasoline, fuel oil, jet fuel, diesel, asphalt or similar substances. Petroleum refinery does not include natural gas processing plants.

6. "Sulfur" means elemental sulfur and the sulfur component of any mixture or compound.

II. Standards for Visible Emissions

A. Maximum Emission

It shall be prohibited to cause or allow emissions of any smoke with a density or shade greater than #1 on the Ringelmann scale for periods aggregating more than one minute in any consecutive thirty minute period.

III. Emission Standards for Particulate Matter

A. Coal Burning Equipment

1. Affected facilities: Coal burning equipment having a power generating capacity in excess of 25 megawatts or a heat input (higher heating value) of greater than 250 MM Btu/hr.

2. Maximum emission

   a) .05 lb/MM Btu heat input (higher heating value)
   b) .02 lb/MM Btu heat input (higher heating value) - maximum for fine particulate matter of less than two microns equivalent aerodynamic diameter.

3. Emission limitations for facilities smaller than the criteria for power generation or heat input capacity as listed in A.1. shall be determined by use of the following:

$$E = 0.96135I^{-0.23471}$$

where: E = maximum particulate emissions in lb/MM Btu heat input; and
I = total heat input in MM Btu/hr

B. Oil Burning Equipment

1. Affected facilities: Oil burning equipment having a heat input of greater than 1 MM MM Btu/yr (per unit).

2. Maximum emissions
   .005 lb/MM Btu heat input

C. Petroleum Processing Facilities

1. Maximum emissions

   a) 0.5 gr/dscf exit gas - exclusive of emissions from

III. Emission Standards for Particulate Matter (Contd.)

catalyst cracking recirculation and regeneration units and tube carbon removal.

b) from catalyst cracking regeneration unit: .02 gr/dscf exit gas plus 0.10 lb/MM Btu of heat input from the auxiliary solid or liquid fuel burned in the incinerator-waste heat boiler.

D. Gasification Plants

1. Maximum emissions - general
   .03 gr/scf exit gas

2. Maximum emissions - gas burning boilers in conjunction with gasification plants
   .03 lb/MM Btu heat input to boilers (lower heating value)

3. Maximum emissions - boilers operated in conjunction with gasification plants and firing more than one fuel

   a) If more than one fuel is fired simultaneously in a boiler, the boiler shall be considered as two or more units, each firing the equivalent amount of fuel with the appropriate heat content separately but having a common stack for determination of allowable emissions. Allowable emissions shall be calculated according to the following formula:

$$E_T = E_o Q_o + E_c Q_c + E_g Q_g$$

where E_T is the total allowed emission in pounds per given period of time;

E_o is the allowed emission from oil in lb/MM Btu's;

E_c is the allowed emission from coal in lb/MM Btu's;

E_g is the allowed emission from gas in lb/MM Btu's;

Q_o is the heat released by the oil based on the higher heating value in Btu's per period of time;

III. Emission Standards for Particulate Matter (Contd.)

Q_c is the heat released by the coal based on the higher heating value in Btu's per period of time;

Q_g is the heat released by the gas based on the lower heating value in Btu's per period of time.

b) In addition to the limitations in 3.a), the total allowable emissions of particulates two microns equivalent aerodynamic diameter or less shall be calculated according to:

$$E_f = 0.40\ E_c\ (Q_o + Q_c + Q_g)$$

where E_f is the total allowed emission of fine particulates in pounds per given period of time, and all other terms remain as defined above.

4. All emissions to the atmosphere shall be through stacks at least ten diameters in length and equipped with adequate platforms and sampling parts for accurate sampling.

5. Fugitive Dust. It shall be prohibited to cause or allow any material to be handled, transported, stored or disposed of or a building or road to be used, constructed, altered or demolished without taking reasonable precautions to prevent particulate matter from becoming airborne.

6. Maximum emissions - Coal briquet forming facilities

a) .03 gr/scf exit gas
b) all particulate matter emissions shall be limited to stack outlets within technical feasibility.

E. Coal Mining and Preparation Plants

1. All persons operating coal preparation plants shall equip all crushers, conveyors, screens, cleaners, hoppers, and chutes which are designed for the continuous transportation or preparation of coal at the coal preparation plant with hoods, shields or sprays where reasonably necessary to prevent particulate matter from becoming airborne.

2. All persons operating a coal mine shall cause main coal haulage roads to be sprayed or to be otherwise treated where reasonably necessary to prevent particulate matter from becoming airborne.

NEW MEXICO: STANDARDS OF PERFORMANCE FOR STATIONARY SOURCES

IV. Emission Standards for Sulfur Compounds

A. SO_2 Standards for Coal Burning Equipment.

1. Affected facilities: Installations having a power generating capacity in excess of 25 megawatts or a heat input of greater than 250 MM Btu/hr.

2. Maximum SO_2 emission
   .34 lb/MM Btu of heat input

B. SO_2 Standards for Oil Burning Equipment

1. Affected facilities: Equipment units having a heat input of greater than 1,000,000 MM Btu/yr.

2. Maximum SO_2 emission
   .34 lb/MM Btu of heat input

C. Petroleum Refineries, Petroleum Processing Facilities, Sulfur Recovery Plants (in conjunction with petroleum processing facilities)

1. Emission standards for sulfur from petroleum refineries

a) Definitions
   i) "Plant processes" includes, but is not limited to, hydrogenation sweetening units, hydrocracking units, fuel burning equipment including flares and incinerators, sweetening system regeneration units, sour water strippers, and similar sulfur releasing systems. "Plant processes" does not include catalyst cracking regeneration units other than hydrocracking units boilers, or process heaters if the emissions from these processes when totaled contain less than 2.5 tons of sulfur per day.

b) Maximum emissions - plant processes

   i) refineries releasing S in plant processes at an avg. rate >5T<30T/day: 10 lb/100 lb S release in plant processes

   ii) refineries releasing S in plant processes at an avg. rate ≥30T/day: 2 lb/100 lb S released in plant processes

c) Maximum emissions - fuel-gas burning equipment

1. lb. of S in exit gases from this equipment shall not exceed the quantity that would exist if S content of fuel gas used was 10gr/100 SCF.

IV. Emission Standards for Sulfur Compounds (Contd.)

2. Standards for H_2S from petroleum processing facilities or sulfur recovery plants (in conjunction with petroleum processing facilities). Either:

   a) Stack emissions shall not be allowed to exceed 10ppm (by vol.) in effluent gas streams; or.

   b) The effluent gas stream containing H_2S shall be passed through suitable equipment to oxidize the H_2S to SO_2. An alarm system shall be installed and maintained at the flare to signal when the 10ppm limitation is being exceeded (non-combustion of the gas).

3. Standards for mercaptans from petroleum processing facilities:

   a) Mercaptan emissions to the atmosphere shall be controlled so that either:
      i) total mercaptan emissions do not exceed 0.25 lb/hr; or
      ii) the gas stream containing mercaptans is passed through a combustion device (including steam condenser if necessary for combustion) which will achieve complete combustion or any other device at least as efficient in preventing mercaptan emissions.

D. Sulfur Recovery Plants - General and those in conjunction with petroleum processing facilities.

1. Affected facilities. This subsection D. shall not apply to a sulfur recovery plant for which a sulfur emission standard is established by any other New Mexico Air Quality Control Regulation herein. Standards for H_2S are not standards established for sulfur for purposes of this subsection. (See IV.C.2. above for H_2S standards for sulfur recovery plants in conjunction with petroleum processing facilities.)

2. Maximum S emissions

Plants introducing:

<20T/day of S into plant:	10 lbs/100 lbs of S introduced into plant
$\geq$20T/day of S into plant:	2 lbs/100 lbs of S introduced into plant

IV. Emission Standards for Sulfur Compounds (Contd.)

E. Gasification Plants

1. Definitions.

a) "Feed" as used in this subsection means those materials which enter directly into the manufacture of synthetic natural gas, and includes, but is not limited to, coal, tars, oils and naptha.

2. Maximum SO_2 emissions - gas-burning boilers
0.16 lb/MM Btu heat input (lower heating value) to all boilers

3. Maximum Sulfur emissions
.008 lb/MM Btu heat input (higher heating value) in feed introduced to plant

4. Hydrogen Sulfide (H_2S) - Carbon Disulfide - Carbon Oxysulfide: Maximum emissions

a) 100ppm (by vol.) in effluent gas, any combination of H_2S, carbon disulfide, and carbon oxysulfide.
b) 10ppm (by vol.) - maximum H_2S component in combined effluent gas.

V. Standards for Organics/Hydrocarbons

A. Petroleum Processing Facilities

1. Hydrocarbon separation policies

a) No person owning or operating a petroleum processing facility that produces waste liquor containing 600 gallons a day or more of hydrocarbons or processes ten thousand barrels/stream day or more of crude oil or condensate feedstock, shall cause or allow discharge of any waste liquor containing hydrocarbons without first having treated the liquor in:
i) a hydrocarbon separation facility equipped with a complete roof cover enclosing the liquid contents; or
ii) any other device which is at least as efficient to prevent hydrocarbon discharge to the atmosphere.

2. Organic Compounds - Storage, Handling, Pumping, and Blowdown Systems.

No person owning or operating a petroleum processing facility shall:

V. Standards for Organics/Hydrocarbons (Contd.)

a) Place, store or hold in a stationary tank or other container having a storage capacity equal to or greater than 65,000 gallons:
   - i) any organic compound having a true vapor pressure greater than 11.0 psia under maximum actual storage pressure conditions, unless the tank or other container is:
     - (1) a pressure vessel capable of maintaining working pressures sufficient at all times to minimize vapor or gas loss to the atmosphere; or
     - (2) equipped with any other system which is at least as efficient at all times to minimize vapor or gas loss to the atmosphere;
   - ii) any organic compound having a true vapor pressure of 1.5 through 11.0 psia under maximum actual storage pressure conditions, unless the tank or other container is designed, equipped and maintained with:
     - (1) a floating roof, consisting of an external floating roof, internal floating cover, or covered floating roof, which is equipped with a closure seal or seals maintained in good repair to close the space between the roof or cover edge and tank wall; or
     - (2) vapor recovery system consisting of a vapor-gathering system capable of collecting organic compound vapors and gases discharged and a vapor disposal system capable of processing the organic vapor and gases so as to minimize their emissions to the atmosphere; or
     - (3) any other device at least as efficient at all times to minimize vapor or gas loss to the atmosphere;
   - iii) any organic compound having a true vapor pressure of 1.5 psia or greater under maximum actual storage pressure conditions without the tank container being equipped with gauging and sampling devices which are gas tight except when gauging or sampling is taking place; or
   - iv) any organic liquid having a true vapor pressure less than 1.5 psia under maximum actual storage pressure conditions without the tank or other container being equipped with a conservation vent or other device which is at least as efficient to minimize vapor or gas loss to the atmosphere.

V. Standards for Organics/Hydrocarbons (Contd.)

b. Cause or allow the loading or unloading into any tank, truck, trailer or tank car any organic compound having a Reid vapor pressure of 1.5 or greater unless:
- i) the loading facility is equipped with:
  - (1) a loading arm having a vapor collection adapter that forces a vapor tight seal between the adapter and the hatch and having a means of collecting the vented vapors to minimize their emission to the atmosphere that is maintained in good repair; or
  - (2) any other device which is at least as efficient to prevent vapor or gas loss to the atmosphere; and
- ii) a means is provided to prevent liquid organic compound drainage from the loading device when it is removed from the hatch of any tank, truck, trailer or tank car or to accomplish complete drainage before its removal.

c. Cause or allow the use of a rotating pump or compressor which handles any organic compound having a Reid vapor pressure of 1.5 psia or greater unless the pump or compressor is equipped with mechanical seals or other devices of equal or greater efficiency to prevent liquid or vapor losses.

d. Cause or allow the operation of a blowdown system without disposing of the gases in a manner which will minimize hydrocarbon emission to the atmosphere. If combustion is the means of disposal, it shall be by:
- i) smokeless flare; or
- ii) any other method that is equally effective to achieve complete combustion.

B. Standards for Hydrocarbon Storage Facilities

1. No person shall place, hold or store hydrocarbons containing hydrogen sulfide in a container associated with petroleum processing facility and having a capacity of twenty-thousand gallons or greater with a throughput of at least 30,000 gallons per week unless the container is equipped with:
   - a) a method of discharging the hydrocarbons into the container below the liquid level; or
   - b) any other method or device equally effective to minimize hydrocarbon and hydrogen sulfide loss to the atmosphere.

C. Standards for Gasification Plants - Storage, Handling, Pumping, Safety Relief Valves, and Blowdown Systems

V. Standards for Organics/Hydrocarbons (Contd.)

No person owning or operating a gasification plant shall:

1. Place, store or hold in any stationary tank or container (except waste water treatment basins, ponds, clarifiers, and settlers) any phenols or any organic compound having a Reid vapor pressure of 1.5 psia or greater, unless the tank or other container is designed, equipped and maintained with:
   a) a floating roof, consisting of a pontoon-type, double-deck roof or internal floating cover which rests on the surface of the liquid contents and is equipped with a closure seal or seals to close the space between the roof or cover edge and tank wall;
   b) a vapor recovery system consisting of:
      i) a vapor gathering system capable of collecting the organic compound vapors and gases discharged; and
      ii) a vapor disposal system capable of processing the organic vapor and gases so as to prevent their emission to the atmosphere; or
   c) any other device which is at least as efficient to prevent vapor or gas loss to the atmosphere.

2. Place, store or hold in any stationary tank or container (except waste water treatment basins, ponds, clarifiers, and settlers) any phenols or any organic compound having a Reid vapor pressure of 1.5 psia or greater without the tank or other container gauging and sampling devices being gas tight, except when gauging or sampling is taking place;

3. Load or unload into any tank, truck or trailer any phenols or any organic compound having a Reid vapor pressure of 1.5 psia or greater unless:
   a) the loading facility is equipped with:
      i) a loading arm having a vapor collection adapter to force a vapor tight seal between the adapter and the hatch and having a means of collecting the vented vapors and preventing their emission to the atmosphere; or
      ii) any other device which is at least as efficient to prevent vapor or gas loss to the atmosphere; and
   b) a means is provided to prevent liquid organic compound drainage from the loading device when it is removed from the hatch of any tank, truck, or trailer or to accomplish complete drainage before its removal.

4. Use a pump or compressor which handles any phenols or any organic compound having a Reid vapor pressure of 1.5 psia or greater, unless the pump or compressor is

V. Standards for Organics/Hydrocarbons (Contd.)

equipped with mechanical seals or other devices of equal or greater efficiency to prevent liquid or vapor losses;

5. Install safety relief valves, except valves installed on gas streams containing steam, product gas, nitrogen or oxygen unless they are connected to a blowdown system; and

6. Operate a blowdown system without disposing of the gases in a manner which will prevent hydrocarbon emissions to the atmosphere. If combustion is the means of disposal, it shall be by smokeless flare or similar means to achieve complete combustion.

VI. Emission Standards for Nitrogen Dioxide (NO_2)

A. Coal Burning Equipment

1. Affected facilities: Coal burning equipment having a power generating capacity in excess of 25 megawatts or a heat input greater than 250 MM Btu/hr.

2. Maximum emission
.45 lb/MM Btu heat input

B. Oil Burning Equipment

1. Affected facilities: Oil burning equipment having a heat input greater than 1,000,000 MM Btu/yr per unit.

2. Maximum Emission
0.3 lb/MM Btu heat input

C. Gas Burning Equipment

1. Affected facilities: Gas burning equipment having a heat input of greater than 1,000,000 MM Btu/yr per unit.

2. Maximum Emission
0.2 lb/MM Btu heat input

VII. Emission Standards for Carbon Monoxide

A. Petroleum Processing Facilities

1. Maximum Emission
500 ppm (by vol.) CO in undiluted effluent gas

VIII. Emission Standards for Hydrogen Cyanide (HCN)

A. Gasification Plants

1. Maximum Emission
10 ppm (by vol.) HCN in effluent gas

IX. Emission Standards for Ammonia (NH_4)

A. Petroleum Processing Facilities

1. Maximum Emission
25 ppm (by vol.) NH_4 in undiluted effluent gas

B. Gasification Plants

1. No person owning or operating a gasification plant shall place, store or hold in any stationary tank or other container any ammonia unless the tank or other container is:

a) a pressure tank capable of maintaining working pressures sufficient to prevent loss of ammonia to the atmosphere; or
b) equipped with other equally effective control equipment to prevent loss of ammonia to the atmosphere.

2. Maximum Emission
25 ppm (by vol.) NH_4 in effluent gas

X. Emission Standards for Hydrogen Chloride/Hydrochloric Acid

A. Gasification Plants

1. Maximum Emission
5 ppm (by vol.), any combination of hydrogen chloride and hydrochloric acid in effluent gas

NEW MEXICO SOLID WASTE MANAGEMENT REGULATIONS

Basis: Solid Waste Management Regulations (April 1974)

Agency: New Mexico Environmental Improvement Agency

Note: (1) A property holder may dispose of solid waste generated on his own property so long as he does not create a nuisance, health hazard or pollute any body of water.

The New Mexico solid waste regulations are primarily applicable to municipalities and cooperative associations (refuse disposal districts), and establishes criteria for the storage, collection, transportation and disposal of solid waste as well as the registration of such a disposal system prior to its creation.

NORTH DAKOTA WATER QUALITY STANDARDS

Basis: Regulation 61-28-02, April 19, 1977

Agency: Issued by the North Dakota State Department of Health; Approved by North Dakota State Water Commission

Notes:

1. These standards are used as the basis for the issuance (or reissuance) of permits for both the construction and operation of industrial facilities including those facilities being developed in the coal mining area of the State.
2. Waters whose existing quality is higher than the established standards will be maintained at the higher quality unless it can be demonstrated that a change in quality is justified.
3. Exceptions to the water quality standards will be granted on a case-by-case basis only.
4. Any industrial development which will constitute a new or increased source of pollution to high quality waters will be required to provide the best practicable degree of treatment available under existing technology as designated under the North Dakota Pollutant Discharge Elimination System.
5. Variances are available from the Department for exceptional circumstances and under such conditions and time limitations as the Department may prescribe.
6. The radiological criteria are not included.

I. GENERAL PROVISIONS AND CRITERIA

A. The following are general requirements for all waste discharges:

1. No untreated industrial waste which contains substances which may endanger water usage shall be discharged into the waters of North Dakota.
2. No untreated domestic sewage shall be discharged into the surface water.
3. Wastes shall be effectively disinfected before discharge into State waters if such discharge would cause a violation of the fecal coliform standards herein.

I. GENERAL PROVISIONS AND CRITERIA (CONT)

4. A higher degree of treatment may be required if such discharges, made during low stream flows, cause violations of stream water quality standards or have a detrimental effect on the beneficial uses of the receiving waters.

5. Industrial waste effluents shall meet all parameters of quality as set forth under the North Dakota Pollutant Discharge Elimination System and shall not violate North Dakota Water Quality Standards.

B. The following minimum conditions are applicable to all receiving waters in North Dakota at all times.

All waters of the State shall be:

1. Free from substances attributable to municipal, industrial, or other discharges that will cause the formation of putrescent or objectionable sludge deposits.

2. Free from floating debris, oil, scum, and other floating materials in sufficient amounts to be unsightly or deleterious.

3. Free from materials producing color, odor, or other conditions in such a degree so as to create a nuisance, to produce any undesirable taste to fish, or so as to make food fish inedible.

4. Free from substances in concentrations or combinations which are toxic or harmful to human, animal, plant, or aquatic life.

5. Free from oil or grease residue attributable to wastewater which causes a visible film or sheen upon the waters, any discoloration of the surface or shoreline, or causes a sludge or emulsion to be deposited beneath the surface of the water or upon the adjoining shoreline.

6. There shall be no materials such as rubbish, etc., or unwanted or discarded materials deposited into the waters of the State.

NORTH DAKOTA WATER QUALITY STANDARDS

II. SPECIFIC WATER QUALITY STANDARDS FOR DESIGNATED CLASSES OF RECEIVING WATERS

The following standards are the prescribed specific water quality criteria for the designated classes of waters to protect the beneficial water uses.

A. Class I Streams

Class I waters shall be such as to permit the propagation and life maintenance of resident fish and shall be suitable for boating, swimming and other water recreation. The quality shall be such that after treatment consisting of coagulation, settling, filtration and chlorination, or equivalent, the treated water will meet the bacteriological, physical, and chemical requirements of the State Health Department (for municipal use).

The requirements of this class shall be as follows:

Substance or Characteristic	Limitation (mg/l)
Ammonia (as N)	≤0.02
Arsenic (Total)	≤0.05
Barium (Dissolved)	≤1.00
Boron (Dissolved)	≤0.50
Cadmium (Total)	≤0.01
Chlorides (Dissolved)	≤100.00
Chromium (Total)	≤0.05
*Copper (Total)	≤0.005
Cyanides (Total)	≤1.00
*Lead (Dissolved)	≤0.05
**Nitrates (Dissolved)	≤1.00
**Phosphates (Dissolved)	≤0.10
*Zinc (Total)	≤1.00
Selenium (Total)	≤0.01
Polychlorinated Biphenyls (Total)	≤0.00
Dissolved Oxygen	≥5.00
pH (range)	7.0-8.5
Temperature	85°F; maximum increase shall not be greater than 5°F above normal background conditions.

NORTH DAKOTA WATER QUALITY STANDARDS

II. SPECIFIC WATER QUALITY STANDARDS FOR DESIGNATED CLASSES OF RECEIVING WATERS (CONT)

Fecal Coliform	≤200/100 ml (geometric mean) based on not less than 5 samples obtained during separate 24-hour periods for any 30-day period - nor shall 10 percent of samples exceed 400/100 ml.
Sodium	≤50 percent of total cations (as mEq/l)
Phenols	≤0.01
Sulfates (Dissolved)	≤250.00
Total Chlorine Residual	≤0.01
Mercury (Total)	≤0.002

*More restrictive criteria than specified may be necessary to protect fish and aquatic life.

**The standards for nitrates and phosphates are intended as guidelines. However, in no case shall the concentration of nitrates exceed 10 mg/l in any waters used to supply municipal or domestic drinking water.

B. Class 1A Streams

The quality and standards for this class of waters shall be the same as that for Class I except treatment for municipal use may require softening and there are the following changes to the chemical and physical criteria:

Substance or Characteristic	Limitation (mg/l)
Chlorides (Dissolved)	≤175.0
Sodium	≤60 percent of total cations (as mEq/l)
Sulfates (Dissolved)	≤450.0

NORTH DAKOTA WATER QUALITY STANDARDS

II. SPECIFIC WATER QUALITY STANDARDS FOR DESIGNATED CLASSES OF RECEIVING WATERS (CONT)

C. Class II Streams

The quality shall be such that its uses shall be the same as those in Class I, except that treatment beyond that set out in Class IA above may be required to meet the drinking water requirements of the State. The physical and chemical criteria shall be the same as for Class IA with the following exceptions:

Substance or Characteristic	Limitation (mg/l)
Chlorides (Dissolved)	≤250.0
*Copper (Total)	≤0.1
**Nitrates (as N)	≤1.5
**Phosphates (Dissolved)	≤0.2
Zinc (Total)	≤2.0
pH (range)	6.0-9.0

*See note (*) in II.A. above
**See note (**) in II.A. above

D. Class III Streams

The quality for this class of waters shall be suitable for INDUSTRIAL uses. These streams all have low average flows and generally prolonged periods of no flow. The physical and chemical criteria shall be those for Class II with the following exceptions:

Substance or Characteristic	Limitation (mg/l)
*Ammonia (as N)	≤0.10
*Arsenic (Total)	≤0.10
Boron (Dissolved)	≤0.75
Cyanides (Total)	≤0.10
Lead (Dissolved)	≤0.10
Sulfate (Dissolved)	≤750.0

*More restrictive criteria may be necessary to protect fish and aquatic life.

III. MISCELLANEOUS PROVISIONS

A. Mixing Zones

The following considerations are to be taken into account when mixing zones are determined:

III. MISCELLANEOUS PROVISIONS (CONTD)

1. The Water Quality Standards must be met at every point outside the mixing zone.
2. The total mixing zone at any cross-sectional area of the stream should not be larger than 25 percent of that cross-sectional area (or volume of flow) and shall not extend to more than 50 percent of the width of the stream.
3. The 96-hour TL_m for indigenous and/or resident fish shall not be exceeded at any point in the mixing zone.
4. Mixing zones shall be as small as possible.

B. Sampling and Testing

All methods of sample collection, preservation and analyses shall be in accordance with the latest edition of "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association or procedures found to be equal or to be more applicable by the Department or the EPA.

C. Streams Not Classified

There are a number of minor or intermittently flowing watercourses, unnamed creeks, or draws, etc., which are not specifically listed or covered; all such waters shall be governed in accordance with the general conditions listed for Class I streams above.

D. Lake Classification

Generally, the beneficial water uses and parameter limitations designated for Class I Streams shall apply to all classified lakes, except for Cold Water Fishery Lakes, where the total chlorine residue shall not exceed 0.002 mg/l. All waters not specifically listed shall be governed in accordance with the general conditions listed for Class I streams above.

NORTH DAKOTA: STANDARDS OF PERFORMANCE FOR STATIONARY SOURCES

Agency: North Dakota State Department of Health

I. GENERAL PROVISIONS

A. Definitions

1. "Air contaminant" means dust, fumes, mist, smoke, other particulate matter, vapor, gas, or any combination thereof, not including water vapor, water mist, or steam condensate.

2. "Air pollution" means the presence in the outdoor atmosphere of one or more air contaminants in such quantities and duration as to threaten or endanger or as is injurious to human health or welfare, animal or plant life, or property.

3. "Department" means the North Dakota State Department of Health.

4. "Fuel burning equipment" means any furnace, boiler apparatus, stack, or appurtenances thereto used in the process of burning fuel or other combustible material for the primary purpose of producing heat or power by indirect heat transfer.

5. "Fugitive dust" means solid airborne particulate matter emitted from any source other than through a stack or chimney.

6. "Heat input" means the aggregate heat content of all fuels whose products of combustion pass through a stack or stacks. The heat input value to be used shall be the equipment manufacturer's or designer's guaranteed maximum input, whichever is greater.

7. "Incinerator" means any article, machine, equipment, device, contrivance, structure or part of a structure used for the destruction of garbage, rubbish, or other wastes by burning or to process salvageable material by burning.

I. GENERAL PROVISIONS (CONTD)

8. "Opacity" means a state which renders material partially or wholly impervious to rays of light and causes obstruction of an observer's view.

9. "Particulate matter" means any material, except water in uncombined form, that is or has been airborne, and exists as a liquid or a solid at standard conditons.

10. "Public nuisance" means any condition of the ambient air beyond the property line of the offending person which is injurious to health, or offensive to the senses, or which causes or constitutes an obstruction to the free use of property so as to interfere with the comfortable enjoyment of life or property.

11. "Submerged fill pipe" means any fill pipe the discharge opening of which is entirely submerged when the liquid level is six inches above the bottom of the tank; or, when applied to a tank which is loaded from the side, shall mean any fill pipe the discharge opening of which is entirely submerged when the liquid level is 1.5 times the fill pipe diameter in inches above the bottom of the tank.

12. "Volatile organic compound" means any compound containing carbon and hydrogen or containing carbon and hydrogen in combination with any other element which has a Modified Reid vapor pressure of 1.5 pounds per square inch absolute (77.6 mm Hg.) or greater under actual storage conditions.

B. General Prohibition. No person shall cause or permit air pollution or a public nuisance (both as defined above), or discharges of air contaminants from any source in such quantities as to cause injury, detriment, nuisance, or annoyance to any person or to the public or so as to endanger the comfort, repose,

I. GENERAL PROVISIONS (CONTD.)

health, or safety of any person or the public, or to cause injury or damage to business or property.

C. Circumvention. The installation or use of any device or means which, without reducing the total amount of air contaminant emitted, conceals or dilutes an air contaminant emission otherwise violating these regulations is prohibited.

D. Guidelines Relative to Ambient Air Quality Standards. In keeping with the purpose of the North Dakota ambient air quality standards, the air quality should be such that:

1. The health of even sensitive or susceptible segments of the population will not be adversely affected;

2. concentrations of pollutants will not cause public nuisance or annoyance;

3. significant damage to animals, ornamental plants, forest and agricultural crops will not occur;

4. visibility will not be significantly reduced;

5. metals or other materials will not be significantly corroded or damaged;

6. fabrics will not be soiled, deteriorated, or their colors affected; and

7. natural scenery will not be obscured.

E. Degradation of Ambient Air Having a Higher Quality than Ambient Air Standards.

1. Ambient air whose quality as of the effective date of these regulations is higher than the ambient air standards shall be maintained at the higher quality unless it can be affirmatively demonstrated to the Department that a change in quality is justifiable and will not be contrary to the guidelines of I.D. above.

I. GENERAL PROVISIONS (CONTD.)

F. Concentration Standards for Air Contaminants Outside the Premises of Stationary Sources.

1. No person shall cause or permit the emission of air contaminants from any premises in such manner and amounts that the concentrations and frequencies attributable to such emission exceeds those shown in the North Dakota ambient air quality standards at any place beyond the premises on which the source is located.

2. Nothing in any other part or section of these regulations shall in any manner be construed as authorizing or legalizing the emission of air contaminants in such manner as prohibited in F.1 above.

II. VISIBLE EMISSION STANDARDS

A. General Standard - Any Single Source

1. A maximum of No. 1 on the Ringelmann Chart, or equivalent Department approved standard.

2. Such opacity as to obscure an observer's view to a degree not in excess of that described in A.1. above.

3. Exceptions.
   a) A maximum of No. 3 on the Ringelmann Chart, or equivalent Department approved standard, for period or periods aggregating not more than 4 minutes in any hour.
   b) Where the presence of uncombined water is the only reason for failure to meet the requirements of A.1. above, no violation exists.

III. PARTICULATE EMISSION STANDARDS

A. Standards for Fuel Burning Equipment Used for Indirect Heating

III. PARTICULATE EMISSION STANDARDS (CONTD.)

1. Maximum emission - Heat inputs of 10,000,000 Btu/hr or less.
   0.600 lbs/hr per million Btu of heat input

2. Maximum emission - Heat inputs in excess of 10,000,000 Btu/hr.
   use: $E = 0.811\ H^{-0.131}$

   where: E = maximum particulates emission in lb/hr per million Btu of heat input; and
   H = heat input in millions of Btu/hr

3. Determination of total heat input. The total heat input of all fuel burning units at the source of emission shall be used in determining the maximum emissions in A.1. and A.2. above.

B. Standards for Incinerators

1. Determination of refuse burning rates (charge capacity). The burning capacity shall be the manufacturer's or designer's guaranteed maximum rate or such other rate as may be determined by the Department in accordance with good engineering practices.

2. Maximum emission - Refuse burning rates (capacities) up to 1000 lb/hr

   use: $E = 0.00515\ R^{0.90}$

   where: E = allowable emission rate in lb/hr; and
   R = refuse burning rate or capacity in lb/hr.

3. Maximum emission - Refuse burning rates (capacities) in excess of 1000 lb/hr

   use: $E = 0.0252\ R^{0.67}$

where: E and R are as in B.2. above.

4. Design standards.
   a) Incinerators shall be the multiple chamber type except that the Department may approve any other type of incinerator upon a finding prior to construction or installation that such other type is equally effective with respect to air pollution control.
   b) Incinerators shall be equipped with auxiliary fuel burners of such capacity and design as to assure a temperature in the secondary combustion chamber of at least 1500°F for not less than 0.3 sec. retention time.

C. Standards for Industrial Processes

1. Definitions
   a) "Process weight" means the total weight of all materials introduced into any specific process which may cause emissions. Solid fuels charged will be considered as part of the process weight, but liquid and gaseous fuels and combustion air will not.
   b) "Process weight rate" means the normal operation maximum capacity of the equipment as then installed and will be increased or decreased in conjunction with equipment or process changes affecting such capacity.

2. Affected facilities. Subsection C. shall apply to any operation, process, or activity emitting particulate matter except for those facilities covered by subsections III.A. and III.B. above.

3. Maximum emission - Process weight rates up to 60,000 lb/hr

use: $E = 4.100^{0.67}$

where: E = rate of emission in lb/hr; and
P = process weight rate in tons/hr

III. PARTICULATE EMISSION STANDARDS (CONTD.)

4. Maximum emission - Process weight rates in excess of 60,000 lb/hr

use: $E = 55.0P^{0.11} - 40$

where: E and P are as in C.E. above

5. More Stringent Standards. The Department may prescribe standards that are more restrictive and/or extensive than those provided in C.3. and 4. above if the particulate matter emitted from a facility is a radioactive, toxic, or deleterious substance which may affect human health or well-being or that would cause significant damage to animal or plant life.

IV. STANDARDS FOR FUGITIVE PARTICULATE MATTER

A. No person shall cause or permit any materials to be handled, transported, or stored, or a building, its appurtenances, or a road to be used, constructed, altered, repaired or demolished without taking reasonable precautions to prevent particulate matter from becoming airborne in amounts which cause a public nuisance or which cause the Ambient Air Quality Standards to be exceeded. Such reasonable precautions shall include, but not be limited to, the following:

1. Use, where possible, of water or chemicals for control of dust in the demolition of existing buildings or structures, construction operations, the grading of roads or the clearing of land;

2. Application of asphalt, oil, water, or suitable chemicals on dirt roads, materials stockpiles, and other surfaces which can give rise to airborne dusts;

3. Installation and use of hoods, fans, and fabric filters to enclose and vent the handling of dusty materials. Adequate containment methods shall be employed during sandblasting or other similar operations;

IV. STANDARDS FOR FUGITIVE PARTICULATE MATTER (CONTD.)

4. Covering, at all times when in motion, open bodied trucks transporting materials likely to give rise to airborne dusts;

5. The paving of roadways and their maintenance in a clean condition; and

6. The prompt removal of earth or other material from paved streets onto which earth or other material has been transported by trucking or earth moving equipment, erosion by water, or other means.

B. When particulate matter or fugitive dust escapes from a building or equipment in such a manner and amount as to cause a nuisance or violate any regulations, the Department may order that the building or equipment in which processing, handling, and storage are done be tightly closed and ventilated in such a way that all emissions from the building or equipment are treated to remove or destroy such particulate matter or fugitive dust before emission to the ambient air.

V. EMISSION STANDARDS FOR SULFUR COMPOUNDS

A. Standards for Fuel Burning Installations

1. Definitions. A "fuel burning installation" is any single fuel burning furnace or boiler or other unit or device in which fuel is burned or any grouping of two or more such furnaces; boilers, or other units or devices on the same premises or otherwise located in close proximity to each other and under control of the same person.

2. Affected facilities. Any installation in which: fuel is burned, it is burned primarily to produce heat, and in which the sulfur dioxide emission is substantially due to the content of the fuel burned.

3. Maximum emission - SO_2
   3.0 lbs of SO_2 per million Btu heat input to the installation.

V. EMISSION STANDARDS FOR SULFUR COMPOUNDS (CONTD.)

B. Standards for Industrial Process Sources

1. Affected facilities. All stationary sources other than those to which the standards of A. above are applicable.

2. The Department may establish emission limitations on the amount of sulfur dioxide, sulfur trioxide, and sulfuric acid which may be emitted from any affected facility in any area if it is determined that such source is causing the applicable Ambient Air Quality Standards to be exceeded.

VI. EMISSION STANDARDS FOR ORGANIC COMPOUNDS

A. Storage Tanks for Volatile Organic Compounds

1. No person shall build or install or permit the building or installation of any stationary tank, reservoir or other container of more than 65,000 gallons capacity which will or might be used for storage of any volatile organic compounds unless such tank, reservoir or other container is to be a pressure tank capable of maintaining working pressures sufficient at all times to prevent vapor or gas loss to the ambient air or is designed for and equipped with one of the following vapor loss control devices:
   a) A floating roof, consisting of a pontoon type, double deck type roof, or internal floating cover, which will rest on the surface of the liquid contents and be equipped with a closure seal or seals, to close the space between the roof edge and tank wall or an internal floating cover or other device equally effective. The control equipment to be provided for in A.1. shall not be permitted if the volatile organic compounds to be stored will have a vapor pressure of 12.0 pounds per square inch absolute or greater under actual storage conditions. All tank gauging and sampling devices shall be built so as to be gas-tight except when gauging or sampling is taking place.

VI. EMISSION STANDARDS FOR ORGANIC COMPOUNDS (CONTD.)

b) A vapor recovery system consisting of a vapor-gathering system capable of collecting the volatile organic compound vapors and gases discharged and a vapor disposal system capable of processing such vapors and gases so as to prevent their emission to the ambient air and with all tank gauging and sampling devices gas-tight except when gauging or sampling is taking place.

c) Other equipment or means of equal efficiency for purposes of air pollution control as may be approved by the Department.

B. Submerged Fill Pipes for Volatile Organic Compounds Storage Tanks.

1. No person shall build or install or permit the building or installation of a stationary volatile organic compounds storage tank with a capacity of 1,000 gallons or more unless such tank is equipped with a submerged fill pipe during loading operations or is a pressure tank or is fitted with a vapor recovery system as described in A.1. above.

C. Loading Facilities for Volatile Organic Compounds

1. No person shall build or install or permit the building or installation of volatile organic compounds tank car or tank truck loading facilities handling 20,000 gallons per day or more unless such facilities are equipped with submersible filling arms or other vapor emission control systems.

D. Pumps and Compressors

1. All rotating pumps and compressors handling volatile organic compounds shall be equipped with mechanical seals or other equipment of equal efficiency for purposes of air pollution control as may be approved by the Department.

E. Waste Gas Disposal

VI. EMISSION STANDARDS FOR ORGANIC COMPOUNDS (CONTD.)

1. No person shall cause or permit the emission of organic compounds gases and vapors, except from a vapor blowdown system or emergency relief system, unless these gases and vapors are burned by smokeless flares or an equally effective control device as approved by the Department.

   Organic compounds gases and vapors which are generated as wastes as the result of oil exploration, development, production, refining, or processing operations and which contain hydrogen sulfide shall be incinerated, flared or treated in an equally effective manner before being released to the ambient air. The emissions from all devices designed for incinerating, flaring or treating waste organic compounds gases and vapors shall result in compliance with the ambient air quality standards.

VII. EMISSION STANDARDS FOR HAZARDOUS AIR POLLUTANTS

A. Definitions

1. "Mercury" means the element mercury, excluding any associated elements, and includes mercury in particulates, vapors, aerosols, and compounds.

2. "Beryllium" means the element beryllium. Where weights or concentrations are specified, such weights or concentrations apply to beryllium only excluding the weight or concentration of any associated elements.

B. Standards

1. Within the category of "Hazardous Air Pollutants" North Dakota has promulgated regulations for asbestos, mercury, beryllium, and beryllium rocket motor firing as has the federal EPA. Of these regulations those for mercury and beryllium are relevant to this project. The North Dakota regulations for these two contaminants are essentially identical to the current federal regulations for mercury and beryllium, for which

VII. EMISSION STANDARDS FOR HAZARDOUS AIR POLLUTANTS (CONTD.)

synopses may be found in the "Federal EPA Regulations and Standards" portion of this report.

VIII. STANDARDS FOR NEW STATIONARY SOURCES

A. North Dakota has promulgated regulations for certain designated major stationary emission sources, largely sources for which there are federal new stationary source performance standards. The standards and language used in the North Dakota regulations are generally identical to those in the federal standards for the same source but there are a few differences and/or additions in the North Dakota provisions.

The sources listed in VIII. B. below are the stationary sources relevant to this project for which North Dakota has new source regulations. Except for the additions noted below for fossil-fuel fired steam generators, the North Dakota regulations listed set standards identical to the federal regulations for like sources. The portions of the applicable federal regulations which are relevant to this project have been synopsized herein and may be found in the "Federal EPA Regulations and Standards" section of this report.

B. The North Dakota regulations for the following sources are applicable to this project (see federal synopses for details).

1. Fossil-fuel fired steam generators. North Dakota regulations in effect make the followng additions to the corresponding federal standards:

a) SO_2 standard where different fuels are burned simultaneously in any combination.

use: $$E = \frac{y(0.8) + z(1.2)}{y + z}$$

where: E = SO_2 in lb per million Btu, total;
y = % of total heat input derived from liquid fossil fuel; and

VIII. STANDARDS FOR NEW STATIONARY SOURCES (CONTD.)

z = % of total heat input derived from solid fossil fuel.

b) NO_x standard where different fuels are burned simultaneously in any combination.

use: $$E = \frac{x(0.2) + y(0.3) + z(0.7)}{x + y + z}$$

where: E = NO_x emitted, expressed as lb NO_2 per million Btu;

x = % of total heat input derived from gaseous fossil fuel;

y = % of total heat input derived from liquid fossil fuel; and

z = % of total heat input derived from solid fossil fuel (except lignite)

2. Incinerators

3. Storage Vessels for Petroleum Liquids

4. Petroleum Refineries

IX. EMISSION STANDARDS FOR CERTAIN SETTLEABLE ACIDS AND ALKALINE SUBSTANCES

A. No person shall cause or permit the emission from any stationary source of substances having acidic or alkaline properties in such manner and amounts that the downwind fallout rate of such substances at any place where an adverse effect could occur exceeds the upwind fallout rate by five or more spots per hour as measured in the manner prescribed [in the North Dakota regulations].

NORTH DAKOTA SOLID WASTE REGULATIONS

Agency: North Dakota State Department of Health

I. GENERAL

A. Definitions

1. "Construction and demolition waste" shall mean waste building materials and rubble resulting from construction, remodeling, repair or demolition operations on houses, commercial buildings, sidewalks, pavements and other structures.

2. "Cover material" shall mean soil or other material acceptable to the Department that is used to cover compacted solid wastes in a land disposal site.

3. "Department" shall mean the North Dakota State Department of Health.

4. "Disposal operation" shall mean any activity regularly conducted or to be conducted upon any tract or parcel of land which is designed to dispose of solid wastes and hazardous wastes.

5. "Groundwater" shall mean water present in the saturated zone of an aquifer.

6. "Hazardous wastes" shall mean any waste or combination of wastes which pose a substantial present or potential hazard to human health or living organisms because such wastes are nondegradable or persistent in nature or because they can be biologically magnified, or because they can be lethal, or because they may otherwise cause or tend to cause detrimental cumulative effects.

7. "Incineration" shall mean the controlled process by which combustible solid, liquid, or gaseous wastes are burned and changed into noncombustible gases.

8. "Leachate" shall mean liquid that has percolated through solid waste and has extracted dissolved, or suspended materials from it.

9. "Open burning" shall mean burning of solid wastes in any manner except in an approved incinerator.

10. "Putrescible waste" shall mean solid waste capable of being decomposed with sufficient rapidity as to cause nuisances from offensive odors or produce fly-breeding conditions.

I. GENERAL (CONT)

11. "Residue" shall mean all the solids that remain after completion of incineration, including bottom ash, flyash, grate siftings, and flue gas desulfurization materials.

12 "Runoff" shall mean the portion of precipitation that drains from an area as surface flow.

13. "Sanitary landfill" shall mean a disposal operation employing an engineered method of disposing of putrescible solid wastes on land by spreading the solid wastes in thin layers, compacting the solid wastes in thin layers, compacting the solid wastes to the smallest practical volume, and applying and compacting cover material at the end of each operating day.

14. "Sludge" shall mean the accumulated semiliquid suspension of settled solids deposited from wastewaters or other fluids in tanks or basins. It does not include solids or dissolved material in domestic sewage or other significant pollutants in water resources, such as silt, dissolved or suspended solids in industrial wastewater effluents, dissolved materials in irrigation return flows or other common water pollutants.

15. "Special use disposal" shall mean a land disposal operation employing an engineering method of disposing of residue, construction and demolition waste, and other nonputrescible waste.

16. "Solid waste" shall mean garbage, refuse, residue, sludges, hazardous waste, putrescible waste, and other discarded solid materials resulting from industrial and commercial operations as well as from communities.

B. Applicability

This Regulation is applicable to all solid waste storage, collection, transportation, disposal, and resource recovery systems.

II. STANDARDS FOR DISPOSAL FACILITIES AND OPERATIONS

A. Sanitary Landfills

1. Every sanitary landfill operation shall have and maintain equipment adequate for the excavation,

compaction, and covering procedures required by this regulation. The equipment shall be provided with safety devices and noise control devices necessary to ensure compliance with any applicable state law.

2. Open burning is hereby prohibited. Appropriate equipment shall be provided and kept at the site during the hours of operation to control accidental fires. Arrangements shall be made with the local fire departments to immediately acquire their services when needed.

3. Dumping of solid waste shall be confined to as small an area as practicable and with appropriate facilities to confine possible windblown material within the area. At the conclusion of each day of operation, all windblown material resulting from the operation shall be collected and returned to the landfill.

4. Solid waste shall be compacted as densely as practicable not to exceed two (2) foot layers, and covered after each day of operation with a compacted layer of at least six (6) inches of suitable cover material.

5. There shall be available an adequate supply of suitable cover material, which, if necessary, shall be stockpiled and protected for winter operation.

6. The sanitary landfill shall be constructed and cover material graded so as to promote surface water runoff without ponding or excessive erosion. Surface water drainage shall be diverted around and away from the landfill operating area.

7. The disposal site shall be provided with an all-weather access road suitable for travel by collection vehicles.

8. Dust control measures shall be provided on the site.

9. Perimeter fencing shall be provided to prevent livestock from entering the site. A gate shall be provided at the entrance to the site and shall be locked when an attendant is not on duty.

10. Supervisory personnel to supervise general operation of the site shall be on duty at all times while it is open for public use.

II. STANDARDS FOR DISPOSAL FACILITIES AND OPERATIONS (CONT)

11. A permanent sign identifying the operation and indicating the hours and days the site is open for public use, rates, hazardous wastes information, the penalty for non-conforming dumping, and other pertinent information shall be posted at the site entrance.

12. The following shall not be accepted for deposit in sanitary landfills except in amounts normal in household wastes:

    a) Liquids.

    b) Any of the following unless approved by the Department: digested sewage sludges, lime sludges, grit chamber cleanings, bar screenings and other sludges. Approval will be based on consideration of such factors as chemical composition, free moisture content and workability.

    c) Any of the following unless approved by the Department: raw sewage sludge, animal manure, septic tank pumpings, or hazardous waste.

13. Scavenging is hereby prohibited to avoid personal injury and prevent interference with operations.

14. All reasonable means shall be taken when necessary to control flies, rodents, and other insects or vermin.

15. Leachate collection and treatment systems approved by the Department shall be used when required by the Department to protect groundwater and surface water.

16. The Department may require that a water monitoring system be constructed and operated to determine if leachate therefrom is causing or may cause pollution of groundwater or surface water. The drilling and construction of all monitoring wells shall be performed in compliance with the Water Well Construction and Water Well Pump Installation Regulations - R43-35-01 of the North Dakota State Department of Health.

17. Decomposition gases may migrate laterally from a sanitary landfill creating a potentially hazardous condition. Should this occur, the Department shall require venting into the atmosphere directly through the cover material, or into cutoff trenches, or into

the atmosphere by forced ventilation, or by other means approved by the Department so that explosive concentrations are prevented.

18. Final Grading and Closure.

All sanitary landfills shall be closed within a reasonable time, or as may be ordered by the Department, after all permitted areas within such landfill have been filled, in the manner prescribed below:

a) All completed disposal sites shall be covered with at least 24 inches of compacted earth, free from cracks and extrusions of refuse.

b) Consideration should be provided for the future use of the site.

c) The surface drainage of the finished disposal site shall be consistent with the surrounding area, and shall not cause interference with drainage of adjacent land nor concentrate runoff water into adjacent areas.

d) The site shall be seeded, at a minimum, with those types of vegetation naturally found in the area surrounding the completed disposal site. If the Department determines that such seeding may cause substantial risk of erosion of the soil covering the completed site, it may require other vegetation to be seeded.

B. Special Use Disposals (See definition at I.A.15)

1. Construction and Demolition Wastes (Defined at I.A.1)

a) Construction and demolition wastes may be received at any special use disposal site operated in accordance with this regulation and any permit limitation.

b) All wastes deposited at the site shall be spread at sufficient intervals to prevent infestation of rodents and prevent nuisances, and shall, at a minimum, be spread every 180 days.

c) In the case of construction and demolition wastes which have large amounts of paper and paper products, provisions shall be made to control blowing litter. In such instances, the Department may require that cover material be spread on a daily basis.

2. Residue (Defined at I.A.11.)

   a) Residue may be received at any special use disposal site operated in accordance with this regulation and any permit limitation.

   b) Dumping of residue shall be confined to as small an area as practicable and with appropriate facilities to confine possible windblown material within the area.

   c) Dust control measures shall be provided on the site.

   d) Leachate collection and treatment systems approved by the Department shall be used where required to protect groundwater and surface water.

   e) The Department may require that a water monitoring system be constructed and operated to determine if leachate therefrom is causing pollution of groundwater or surface water. The drilling and construction of all monitoring wells shall be performed in compliance with the Water Well Pump Installation Regulations - R43-35-01 of the North Dakota State Department of Health.

3. Final Grading and Closure.

   The same criteria apply as for Sanitary Landfills - shown at II.A.18. above.

C. Incinerators

1. All incinerators used for solid waste may incorporate the use of auxiliary fuel and shall be constructed and operated in compliance with the Air Pollution Control Regulations of the State of North Dakota.

2. Supervisory personnel shall be on duty at all times during operation of the incinerator.

3. Arrangements shall be made to assure efficient unloading of refuse at the point or points designated for this purpose.

II. STANDARDS FOR DISPOSAL FACILITIES AND OPERATIONS (CONT)

4. Every incinerator, including the unloading area and the charging floor, shall be maintained in a clean and nuisance-free condition at all times. The accumulation of putrescible refuse, rubbish, and reclaimed materials shall be strictly controlled to eliminate odors, harboring of insects and rodents, scattering of materials by the wind, or interference with the operation of the facility.

5. Every incinerator site shall be provided with an all-weather access road suitable for travel by collection vehicles.

6. Each site shall be provided with fencing and lockable gates, thus providing access control to the site and the unloading area.

D. Standards for Other Methods of Disposal

New and unique methods that may be developed subsequent to the adoption of these regulations and that, in the opinion of the Department, can be utilized without environmental degradation and creation of hazards to public health and safety will be considered for use by the Department. No such methods of solid waste disposal shall be allowed without applicable permits issued by the Department.

E. Disposal of Hazardous Wastes

1. Disposal of hazardous wastes shall be the responsibility of the owner of such wastes. Hazardous wastes may not be deposited in a disposal operation site except in amounts normal in household waste, unless approved by the Department. The Department may provide technical assistance to the owner for storage, transportation, and disposal of hazardous wastes.

2. Non-returnable empty pesticide containers shall be rinsed and punctured in order to avoid secondary use of such containers, if such punctured containers will not endanger humans, animals, or the environment.

III. RESOURCE RECOVERY CRITERIA

A. Any resource recovery or recycling of solid wastes shall be done in a manner that will prevent a public nuisance.

B. It is the intent of these regulations to promote the planning and application of resource recovery systems.

IV. STORAGE CRITERIA

A. Temporary Storage - Responsibility For.

The owner and occupant of any premises, business establishment, or industry shall be responsible for the storage of all solid wastes accumulated at the premise, business establishment or industry.

B. Bulk Containers

Bulk containers shall be constructed of durable, rust and corrosion resistant material; be equipped with tight fitting lids or doors to prevent entrance of insects or rodents; and shall be watertight, leakproof and weatherproof.

C. Maintenance of Containers

All containers for storage of solid waste shall be maintained in such a manner as to prevent the creation of a nuisance. Containers that are broken or otherwise fail to meet requirements of this regulation shall be replaced with complying containers.

D. Open storage is prohibited for non-putrescible solid wastes, such as brush, newspapers, and magazines. These materials shall be bundled or placed in containers to prevent scattering. Bundles shall not exceed fifty pounds in weight and four feet in length. Such wastes shall not be placed out for collection prior to 24 hours before scheduled pickup.

E. Storage of Hazardous Wastes

Storage of hazardous wastes shall be the responsibility of the owner until the wastes are disposed of. The Department may provide technical assistance to the owner for storage, transportation, and disposal of hazardous wastes.

V. COLLECTION AND TRANSPORTATION CRITERIA

A. Frequency of Collection

Solid wastes shall be collected at sufficiently frequent intervals to prevent nuisances. The interval shall not exceed one week.

B. Vehicles Required, Generally

Vehicles used for the collection and transportation of any nonputrescible solid waste shall be loaded and moved

V. COLLECTION AND TRANSPORTATION CRITERIA (CONT)

in such a manner that the contents will not fall, leak or spill therefrom, and shall be covered to prevent scattering of material. Where spillage does occur, the material shall be picked up immediately by the collector or transporter and returned to the vehicle or container and the area cleaned.

C. Hazardous Waste Collection and Transportation

Vehicles used for the collection and transportation of hazardous wastes shall be durable, enclosed, leakproof and shall be loaded, moved, and unloaded in a safe manner in compliance with other applicable federal, state, and local regulations.

D. Permit Requirements

Every person owning or operating a refuse collection service shall obtain a permit from the department, with permit application to be made on a form provided by the Department. A permit granted shall be valid for two years from date of issuance.

OHIO WATER QUALITY STANDARDS

Basis: Regulation EP-1, Water Quality Standards

Agency: Ohio Environmental Protection Agency

I. GENERAL STANDARDS FOR WATER OF THE STATE

A. Within 500 yards of any public water supply intake:

1. Dissolved solids may exceed one, but not both of the following:
   a. 500 mg/l as monthly average nor exceed 750 mg/l at any one time; or
   b. 150 mg/l attributable to human activities.

2.	Phenols	≤1.0 ug/l
3.	Nitrate (as N)	≤8 mg/l
4.	Dissolved Iron	≤300 ug/l
5.	Chromium	≤10 ug/l
6.	Cyanides	≤0.005 mg/l
7.	Dissolved Manganese	≤50 ug/l

B. Within 500 yards of any water supply intake:

1. Dissolved Solids may exceed one, but not both of the following:
   a. 500 mg/l as a monthly average nor exceed 750 mg/l at any one time, or
   b. 150 mg/l attributable to human activities.

C.	Dissolved Oxygen	5.0 mg/l daily average nor less than 4.0 mg/l at anytime.
D.	pH (range)	6.0 - 9.0 attributable to human activities.
E.	Fecal Coliform	
1.	Geometric Mean (based on not less than 5 samples within 30 day period)	≤200/100 ml
2.	In more than ten percent of samples taken during any 30 day period.	≤400/100 ml

OHIO WATER QUALITY STANDARDS

I. GENERAL STANDARDS FOR WATER OF THE STATE (CONTD.)

F. Dissolved Solids may exceed one, but not both of the following:

1. 1,500 mg/l

2. 150 mg/l attributable to human activities

G. Temperature Increase Attributable to Human Activities

1. Lakes or Reservoirs ≤ 3°F rise

2. Stream Water ≤ 5°F rise

H. Threshold - Odor Number ≤ 24 at 40°C

I. The following chemical pollutants shall not exceed the specified concentrations at any time.

Constituent	Concentration	
	mg/l	ug/l
1. Ammonia	1.5	-
2. Arsenic	-	50.0
3. Barium	-	800.0
4. Cadmium	-	5.0
5. Chloride	250.0	-
6. Chromium	-	300.00
7. Chromium (hexavalent)	-	50.0
8. Cyanide (free)	0.005	-
9. Cyanide	0.20	-
10. Fluoride	1.3	-
11. Foaming Agents	0.5	-
12. Iron (dissolved)	-	1000.0
13. Lead	-	40.0
14. Manganese (dissolved)		1000.0
15. Mercury	-	0.5
16. Oil and Grease (hexane soluble)	5.0	-
17. Phenols	-	10.0
18. Selenium	-	5.0
19. Silver	-	1.0

J. Total Copper shall not exceed the following specified concentrations at any time:

Hardness as mg/l of CaCO	0-8	80-160	160-240	240-320	above 320
Concentration in ug/l	5	10	20	50	

OHIO WATER QUALITY STANDARDS

I. GENERAL STANDARDS FOR WATER OF THE STATE (CONTD.)

K. Total Zinc shall not exceed the following specified concentrations at any time:

Hardness as mg/l of CaCO	0-80	80-160	160-240	240-320	above 320
Concentration in ug/l	75	100	200	400	500

L. Total Phosphorus (as P)

1. Ohio River and all tributary waters

a. Limited to the extent necessary to prevent nuisance growths of algae, weeds and slimes, phosphorus discharges from point sources determined significant by Ohio EPA shall not exceed 1 mg/l or such stricter requirements as may be imposed by Ohio EPA NPDES permit.

M. 96 Hour Median Tolerance Limit

All pollutants or combinations of pollutants shall not exceed at any time one-tenth of the 96 hour median tolerance limit for any indigenous aquatic species.

N. All waters of the state shall be free from substances attributable to human activities which result in sludge deposits, floating materials, color, turbidity, or other conditions in such degree so as to create a nuisance.

II. SPECIFIC WATER USE CLASSIFICATIONS

The remainder of the Ohio Water Quality Standards pertain to specific water use classifications and to specific named waters of the state. The following criteria are applicable for the evaluation of stream quality for Public Water Supply, and for Industrial Water Supply and aquatic life.

A. Potable Water Supply

1. Bacteria

a. Coliform Group	≤5000/100 ml as a monthly average; nor exceed this number in more than 20% of the samples during any month; nor exceed 20,000/100 ml in more than 5% of such samples.
b. Threshold-Odor Number	≤24 (at 60°C) as daily average.

II. SPECIFIC WATER USE CLASSIFICATIONS (CONTD.)

c. Dissolved Solids	$\leq$500 mg/l as monthly average, nor exceed 750 mg/l at any time.

d. Maximum Allowable Chemical Constituents

Constituent	Concentration (mg/l)
1. Arsenic	0.05
2. Barium	1.0
3. Cadmium	0.005
4. Chromium (hexavalent)	0.05
5. Cyanide	0.025
6. Fluoride	1.0
7. Lead	0.05
8. Selenium	0.005
9. Silver	0.05
10. Mercury	0.005

B. Industrial Water Supply

The following criteria are applicable to stream waters for industrial cooling and processing:

1. Dissolved Solids	$\leq$500 mg/l as monthly average, nor exceed 750 mg/l at any time.

C. For Aquatic Life (Warm Water Fishery)

The following criteria are applicable at any point in the stream except for the minimum mixing zone, and they are for evaluation of conditions for the maintenance of a well balanced, warm-water fish population.

1. Dissolved Oxygen	5.0 mg/l per day and not less than 4.0 mg/l at any time.
	6.0 - 8.5 (except when correlated with photosynthetic activity.

OHIO WATER QUALITY STANDARDS

II. SPECIFIC WATER USE CLASSIFICATIONS (CONTD.)

3. Temperature (all waters except main stream of Mahoning River).	<5°F rise above natural temperature.
4. Toxic Substances	≤One-tenth of 96-hour median tolerance limit.

OHIO: STANDARDS OF PERFORMANCE FOR STATIONARY SOURCES

Agency: Ohio Environmental Protection Agency

I. General Provisions

A. Definitions

1. "Fuel-burning equipment" means any furnace, boiler, apparatus, stack, and all appurtenances thereto, used in the process of burning fuel for the primary purpose of producing heat or power by indirect heat transfer.

2. "Fugitive dust" means a state which renders material partially or wholly impervious to rays of light and causes obstruction of an observer's view.

3. "Opacity" means a state which renders material partially or wholly impervious to rays of light and causes obstruction of an observer's view.

4. "Particulate matter' means any material, except water in uncombined form, that is or has been airborne, and exists as a liquid or a solid at standard conditions.

B. The significant and avoidable deterioration of air quality in any part of an area where presently existing air quality is equal to or better than that required by Ohio ambient air quality standards shall be prohibited.

II. Visible Emission Standards

A. Maximum Emission
No. 1 on Ringelmann Chart (20% opacity)

B. Exceptions

1. Emissions not darker than No. 3 on Ringelman Chart (60% opacity) shall not be violations of this regulation if for periods aggregating not more than three minutes in any 60 minute period or for such other period as may be set by the Board.

2. It shall not be a violation where the presence of uncombined water is the only reason for failure of an emission to meet the standards of this section.

III. Standards for Fugitive Dust

A. It shall be prohibited to cause or allow any materials to be handled, transported, or stored, or any building or its appurtenances or road to be used, constructed, altered, repaired, or demolished without taking reasonable precautions

III. Standards for Fugitive Dust (Contd.)

to prevent particulate matter from becoming airborne.

Such reasonable precautions shall include, but not be limited to, the following:

1. Use, where possible, of water or chemicals for control of dust in the demolition of buildings or structures, construction operations, the grading of roads or the clearing of land;

2. Application of asphalt, oil, water, or suitable chemicals on dirt roads, materials stockpiles, and other surfaces which can create airborne dusts;

3. Installation and use of hoods, fans, and control equipment to enclose, contain, capture and vent the handling of dusty materials; adequate containment methods shall be employed during sandblasting or other similar operations;

4. The paving of roadways and their maintenance in a clean condition;

5. The prompt removal of earth or other material from paved streets onto which earth or other material has been deposited by trucking or earth moving equipment or erosion by water or other means.

B. When dust, fumes, gases, mist, odorous matter, vapors, smoke, other particulate matter or any combination thereof escape from a building or equipment in such manner and amount as to cause a nuisance or to violate Section II or any other regulation, the Board may order that the building or equipment in which processing, handling and storage are done be tightly closed and ventilated so that all air, gases, and airborne material leaving the building or equipment are treated by removal or destruction of air contaminants before discharge to the open air.

IV. Emission Standards for Particulate Matter

A. Definitions

1. Priority I Region: indicates that the pollutant concentration (measured or estimated) is greater than the federal primary ambient air quality standard in that region.

IV. Emission Standards for Particulate Matter (Contd.)

2. Priority II Region: indicates that the pollutant concentration (measured or estimated) is greater than the secondary air quality standard, but less than the Priority I range in the region.

3. Priority III Region: indicates that the pollutant concentration (measured or estimated) is presently less than the secondary air quality standard in that region.

4. "Process weight" means the total weight of all materials introduced into the source operation including solid fuels, but excluding gaseous fuels and liquid fuels when they are used solely as fuels and excluding air introduced for the purpose of combustion.

5. "Uncontrolled mass rate of emission" means the total weight rate at which particulate matter is, or in the absence of an air cleaning device would be emitted from an air contaminant source when such source is operated at its maximum rated capacity.

B. Fuel Burning Equipment

1. Affected facilities: Installations in which fuel is burned for the primary purpose of producing heat or power by indirect heat transfer. Fuels include those such as coal, coke, lignite, coke breeze, and fuel oil but do not include refuse. When any products or byproducts of a manufacturing process are burned for the same purpose or in conjunction with any fuel, the same maximum emission limitations shall apply.

2. Maximum Emission (all priority regions)

$\leq$ 10 MM Btu/hr total heat input:
    0.4 lbs/MM Btu heat input
$\leq$ 1000 MM Btu/hr total
10 MM Btu/hr heat input: Use $E = 0.8q^{-0.301}$*
    where: E = maximum allowable emission in lb/MM Btu heat input; and q = total heat input in MM Btu/hr
$>$ 1000 MM Btu/hr total heat input:
    0.1 lbs/MM Btu heat input

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* Equation is not shown in current Ohio regulations obtained directly from Ohio EPA; regulations have curve illustrating equation from 10 MM Btu/hr to 1000 MM Btu/hr.

IV. Emission Standards for Particulate Matter (Contd.)

3. The heat input shall be the aggregate heat content of all fuels whose products of combustion emanate from a single fuel burning unit. The heat input value used shall be the equipment manufacturer's or designer's guaranteed maximum input, whichever is greater. The total heat input of all fuel burning units at a plant or premises which are united either physically or operationally shall be used for determining the maximum allowable amount of particulate matter which may be emitted from any single fuel burning unit.

C. Incinerators

1. Maximum Emission

Burning Capacity
<100 lb/hr: 0.2 lb/100 lb combustible refuse charged

≥100 lb/hr: 0.10 lb/100 lb combustible refuse charged

2. Burning capacity of an incinerator shall be the manufacturer's or designer's guaranteed maximum rate or such other rate as may be determined by the Board in accordance with good engineering practice.

3. The total capacities of all furnaces within one system shall be considered as the incinerator capacity.

D. Industrial Processes

1. Affected facilities: Any operation, process, or activity from which particulate matter is emitted except facilities and equipment covered under subsections B. and C. herein.

2. Maximum Emissions - Priority I Regions

a) Controlling Standards: The maximum emissions rate determined by 2.b) or 2.c) whichever is applicable, below shall control. Where both 2.b) and 2.c) are applicable, the more stringent of the two limitations shall apply. 2.b) shall apply where the process weight of all materials introduced into any process that could cause any particulate emission are known but where the uncontrolled mass rate of emission and the process emission factor characterization is unknown. Where the uncontrolled mass rate of emission is known or can be ascertained, 2.c) shall be used.

OHIO: STANDARDS OF PERFORMANCE FOR STATIONARY SOURCES

IV. Emission Standards for Particulate Matter (Contd.)

b) Process weight rate basis

$\leq$ 60,000 lb/hr, process weight rate:

Use: $E = 4.10P^{0.67}$

Where: E = maximum emission rate in lb/hr; and
P = process weight rate in T/hr.

$>$ 60,000 lb/hr, process weight rate:

Use: $E = 55.0P^{0.11} - 40$

Where: (E and P are as defined above)

c) Uncontrolled mass rate of emission basis*

(Equations in this subsection are not shown in current Ohio regulations - obtained directly from Ohio EPA; regulations have curves based on these equations)

$>$10 lb/hr $\leq$ 20 lb/hr, uncontrolled mass rate of emission:

Use: $A = .20\ U$

Where: A = maximum allowable emission in lb/hr;
U = uncontrolled mass rate of emission in lb/hr.

$>$ 20 lb/hr $\leq$ 1000 lb/hr, uncontrolled mass rate of emission:

Use: $A = 0.5782U^{0.6456}$

Where: (A and U are as defined above)

$>$ 1000 lb/hr $\leq$ 6000 lb/hr, uncontrolled mass of rate of emission:

50 lb/hr maximum allowable emission

$>$ 6000 lb/hr $\leq$ 27,000 lb/hr, uncontrolled mass rate of emission:

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* The uncontrolled mass rate of emission from all similar process units at a plant, such units being united either physically or operationally or otherwise located in close proximity to each other, shall be used for determining the maximum allowable mass rate of emission that passes through a stack or stacks.

IV. Emission Standards for Particulate Matter (Contd.)

Use: $A = 0.1296U^{0.6846}$

Where: (A and U are as defined above)

> 27,000 lb/hr, uncontrolled mass rate of emission:

Use: $A = 34.44U^{0.1374}$

Where: (A and U are as defined above)

3. Maximum Emissions - Priority II and III Regions

Use method shown in 2.c) above to determine allowable emissions (uncontrolled mass rate of emission basis).

V. Emission Standards for Sulfur Compounds

A. Definitions

1. Priority Regions: (see IV. A. herein for definitions of Priority Regions I - III.)

B. Industrial Processes

1. Maximum SO_2 Emission Concentrations - General

a) 500 ppm (vol.) in effluent gas.

b) Exceptions. Sources covered by other specific limitations in subsections 3. and 4. below.

2. Maximum H_2S Emission Concentration - General

100 gr/100 SCF of gas emitted or combusted

3. Maximum SO_2 Emission from Sulfur Recovery Plants
0.01 lb/lb of S processed

4. Exemption. Emergency discharge from safety relief valves shall be exempt from the requirements of subsection B. herein provided that state regulations concerning reporting requirements are complied with.

C. Emisson Standards for Fuel Burning Equipment

1. Affected facilities: Any installation in which fuel is burned and in which the SO_2 emission is largely due to the sulfur content of the fuel burned, and in which the fuel is burned primarily to produce heat or power by indirect heat transfer.

V. Emission Standards for Sulfur Compounds

2. Definitions.

a) For purposes of this subsection "fuel burning equipment" means any single fuel-burning furnace or boiler or other unit, device, or contrivance in which fuel is burned or any grouping of two or more such furnaces or boilers or other units, devices, or contrivances which are united either physically or operationally or otherwise located in close proximity to each other and controlled by the same facility. The capacity of such installation shall be the manufacturer's or designer's guaranteed maximum heat input rate.

3. Use as raw material. If a fuel is used as an essential raw material in a manufacturing operation and its heat value is an incidental part of the operation, the restrictions of subsection C. shall not apply and the source shall be controlled under the provisions of subsection B. and such other restrictions as the Board may impose to assure that the air quality standards will be met.

4. Nothing in this regulation shall be interpreted to preclude research or experimentation into alternate methods of meeting the intent and restrictions of this regulation.

5. Maximum Sulfur Compound Emissions (expressed as SO_2)
1.0 lb/MM Btu heat input (regardless of Priority Region)

VI. Standards for Organic Materials

A. Definitions

1. "Organic material" means any chemical compound containing carbon, excluding carbon monoxide, carbon dioxide, carbonic acid, metallic carbides, metallic carbonates, and ammonium carbonate.

2. "Photochemically reactive material" means any liquid organic material with an aggregate of more than 20 percent of its total volume composed of the chemical compounds classified below or which exceeds any of the following individual percentage composition limitations, referred to the total volume of liquid:

VI. Standards for Organic Materials (Contd.)

a) A combination of hydrocarbons, alcohols, aldehydes, esters, ethers or ketones having an olefinic or cyclo-olefinic type of unsaturation: 5%;
b) A combination of aromatic hydrocarbons with eight or more carbon atoms to the molecule except ethyl benzene: 8%;
c) A combination of ethylbenzene, ketones having branched hydrocarbon structures, trichlorethylene or toluene: 20%.

Whenever any organic material or any constituent of an organic material may be classified from its chemical structure into more than one of the above groups of organic compounds, it shall be considered as a member of the most reactive chemical group, that is, that group having the least allowable percent of the total volume of liquid.

3. "Volatile photochemically reactive material" means photochemically reactive material which has a vapor pressure of 1.5 pounds per square inch absolute or greater under actual storage conditions.

4. "Effluent water separator" means any tank, box, sump, or other container in which any volatile photochemically reactive material floating on or entrained or contained in water entering such tank, box, sump, or other container is physically separated and removed from such water prior to outfall, drainage, or recovery of such water.

B. Except as otherwise provided in these regulations, all sources of photochemically reactive materials shall minimize such emissions by use of the latest available control techniques and operating practices in accordance with best current technology.

C. Nothing in this regulation shall be construed to preclude the use of alternative means to abate emissions, if such alternative is approved by the Board and will not result in emissions significantly greater than would result from the application of the means specified herein.

D. Storage of volatile photochemically reactive materials:

1. It shall be prohibited to place, store, or hold in any stationary tank, reservoir or other container of more than 65,000 gallons capacity any volatile photochemically reactive material unless such tank,

VI. Standards for Organic Materials (Contd.)

reservoir, or other container is a pressure tank capable of maintaining working pressures sufficient at all times to prevent vapor or gas loss to the atmosphere or is designed, and equipped with one of the following vapor loss control devices:

a) A floating pontoon or double-deck type cover equipped with closure seals to enclose any space between the cover's edge and compartment wall. This control equipment shall not be permitted if the volatile photochemically reactive material has a vapor pressure of 12.5 pounds per square inch absolute or greater under actual storage conditions. All tank gauging or sampling devices shall be gas-tight except when tank gauging or sampling is taking place.

b) A vapor recovery system which reduces the emission of organic materials into the atomosphere by at least 90 percent by weight. All tank gauging or sampling devices shall be gas-tight except when tank gauging or sampling is taking place.

c) Other equipment or means of air pollution control as may be approved by the Board.

2. It shall be prohibited to place, store, or hold in any stationary storage vessel of more than 500-gallon capacity any volatile photochemically reactive material unless such vessel is equipped with a permanent submerged fill pipe, is loaded through the use of a portable loading tube which can be inserted below the liquid level line during loading operations, or is a pressure tank as described in subsection D.1. of this regulation or is fitted with a vapor recovery system as described in subsection D.1.b of this regulation.

E. Loading Facilities for Volatile Photochemically Reactive Materials

1. It shall be prohibited to load in any one day more than 40,000 gallons of any volatile photochemically reactive material into any tank truck, trailer, or railroad tank car from any loading facility unless the loading facility is equipped with a vapor collection and disposal system properly installed, and consisting of one of the following:

VI. Standards for Organic Materials (Contd.)

a) An adsorber system or condensation system which processes and recovers at least 90 percent by weight of all vapors and gases from the equipment being controlled.
b) A vapor handling system which directs all vapors to a fuel gas system.
c) Other equipment or means for purposes of air pollution control as may be acceptable to and approved by the Board.

2. All loading from facilities subject to the provisions of subsections E.1.a and E.1.b of this regulation shall be accomplished in such a manner that all displaced vapors and gases shall be vented only to the vapor collection system. A means shall be provided to prevent liquid drainage from the loading device when it is not in use or to accomplish complete drainage before the loading device is disconnected.

F. Volatile Photochemically Reactive Material/Water Separation

1. It shall be prohibited to use any compartment of any vessel or device operated for the recovery of volatile photochemically reactive materials from an effluent water separator which recovers 200 gallons a day or more of any volatile photochemically reactive material unless such compartment is equipped with one of the following vapor loss control devices properly installed:

a) A solid cover with all openings sealed and totally enclosing the liquid contents of the compartment. All gauging and sampling devices shall be gas-tight except when gauging or sampling is taking place.
b) A floating pontoon or double-deck type cover equipped with closure seals to enclose any space between the cover's edge and compartment wall. All gauging and sampling devices shall be gas-tight except when gauging or sampling is taking place.
c) A vapor recovery system which reduces the emission of organic materials into the atmosphere by at least 90 percent by weight. All gauging and sampling devices shall be gas-tight except when gauging or sampling is taking place.
d) Other equipment or means of air pollution control as may be approved by the Board.

G. Operations Using Liquid Organic Materials

1. It shall be prohibited to discharge more than 15 pounds of organic materials into the atmosphere in any one day

VI. Standards for Organic Materials (Contd.)

nor more than 3 pounds in any one hour, from any article, machine, equipment, or other contrivance in which any liquid organic material or substance containing liquid organic material comes into contact with flame or is heat-cured or heat-polymerized, in the present of oxygen, unless said discharge has been reduced by at least 85 percent.

2. It shall be prohibited to discharge more than 40 pounds of organic material into the atmosphere in any one day, nor more than 8 pounds in any one hour, from any article, machine, equipment, or other contrivance used under conditions other than described in subsection G.1 of this regulation for employing, applying, evaporating or drying any photochemically reactive material or substance containing such photochemically reactive material, unless said discharge has been reduced by at least 85 percent.

3. Emissions of organic materials into the atmosphere required to be controlled by subsection G.1 or G.2 of this regulation, shall be reduced by:

   a) Incineration, provided that 90 percent or more of the carbon in the organic material being incinerated is oxidized to carbon dioxide, or
   b) Adsorption, or
   c) Processing in a manner determined by the Board to be not less effective than (a) or (b) above.

4. The provisions of section G. of this regulation shall not apply to:

   a) The use of equipment for which other requirements are specified by D., E., and F. of this regulation, or which are exempt from air pollution control requirements by said subsections.
   b) The use of any material, in any article, machine, equipment, or other contrivance described in subsection G.1 or G.2 of this regulation, if:
      (i) the volatile content of such material consists only of water and liquid organic material, and
      (ii) the liquid organic material comprises not more than 20 percent of said volatile content, and
      (iii) the volatile content is not photochemically reactive material.

VI. Standards for Organic Materials (Contd.)

c) The use of any material, in any article, machine, equipment or other contrivance described in subsection G.1. or G.2. of this regulation, if:
(i) the volatile content of such material does not exceed 20 percent by volume of said material, and
(ii) the volatile content is not a photochemically reactive material.

d) The use, in any article, machine, equipment, or other contrivance described in subsection G.1. or G.2. of liquid organic materials which exhibit a boiling point higher than 220°F at 0.5 millimeter mercury absolute pressure, or having an equivalentvapor pressure, unless such liquid organic material is exposed to temperatures exceeding 220°F.

e) The use of any material, in any article, machine, equipment or other contrivance described in subsection G.1. or G.2., if it can be demonstrated to the Board's satisfaction that the emissions of organic material into the atmosphere from such article, machine, equipment or other contrivance are not photochemically reactive.

H. Disposal and evaporation of solvents.

1. It shall be prohibited to, during any one day, dispose of a total of more than 1-1/2 gallons of any volatile photochemically reactive material, or dispose of any substance containing more than 1-1/2 gallons of any volatile photochemically reactive material, by any means which will permit the evaporation of such volatile photochemically reactive material into the atmosphere.

I. Waste gas disposal.

1. It shall be prohibited to emit organic materials into the atmosphere from a waste gas flare system unless such materials are burned by smokeless flares, or an equally effective control device is used as approved by the Board.

2. Emissions from emergency relief and vapor blowdown systems shall be controlled upon special order of the Board by burning by smokeless flare or use of an equally effective device as may be approved by the Board.

VII. Emission Standards for Nitrogen Oxides (NO_x)

A. General Standards

1. Affected facilities: All stationary sources of NO_x emissions except as covered in B. of this section.

2. All NO_x stationary sources shall minimize NO_x emissions by use of the best currently available control technology.

B. Standards for Combustion Sources

1. Maximum Emission (NO_x calculated as NO_2)
   coal fired units with heat input capacity
   $\geq$250 MM Btu/hr: 0.9 lb/MM Btu heat input

VIII. Emission Standards for Carbon Monoxide (CO)

A. General Standard.

All carbon monoxide sources shall be minimized by use of the best currently available control technology.

B. Petroleum Processes.

It shall be prohibited to emit CO in effluent gas streams from any catalyst regeneration associated with a petroleum cracking system or any other petroleum process unless such effluent stream is burned at 1300°F for 0.3 seconds or more in a direct-flame afterburner or boiler.

C. Alternate means to abate emissions regulated in this section are not precluded, provided each alternative is approved by the Board and will result in substantially equivalent or better control of relevant emissions.

IX. Standards for Odorous Emissions

A. Incinerators

1. Incinerators, including all associated equipment and grounds, shall be designed and operated so as to prevent the emission of objectionable odors.

OHIO SOLID WASTE REGULATIONS

Basis: Regulations EP-20 and EP-33 (July 1976)

Agency: Ohio Environmental Protection Agency (EPA)

The Ohio EPA regulations, EP-20 and EP-33, provide criteria applicable to the disposal of solid waste in the State of Ohio. The regulations specify requirements for the required data which must be submitted with the application for approval of a waste disposal facility plan. Such approval is required from the Ohio EPA prior to any person establishing a new facility.

The primary emphasis of the regulations is directed toward the operation of solid waste disposal facilities once they have been designed and constructed in accordance with the detailed plans, specifications and the other information required to be submitted for approval.
The regulation must be examined to fully determine all necessary information which must be submitted in order to obtain the necessary approval.

The regulations additionally provide requirements for the operation of sanitary landfills along with specific criteria which must be followed for the closure of sanitary landfills.

OKLAHOMA WATER QUALITY STANDARDS

Basis: Oklahoma Water Quality Standards, 1976 (adopted in April 1977).

Agency: Oklahoma Water Resources Board.

I. GENERAL STANDARDS

The numerical and descriptive criteria established by the general standards shall be maintained at all times, and apply to all waters of the State except when otherwise exempted by special standards or for streams when the flow is less than the seven-day, two-year low flow.

A. Condition or Substance	Limitations
1. Oil and Grease	All waters of the state shall be maintained free of oil and grease to prevent a visible film of oil or grease on or in the water. Oil or grease shall not be present in quantities that adhere to stream banks and coat the bottom, or which causes deleterious effects to the biota.
2. Solids (suspended and/or settleable)	The waters shall be essentially free of floating debris, bottom deposits, scum, foam or other materials including suspended substances of a persistent nature from other than natural causes.
3. Turbidity (From other than natural sources)	Warm Water Streams - ≤ 50 Jackson Units Warm Water Lakes - 25 Jackson Units Cold Water Streams - ≤ 10 Jackson Units

OKLAHOMA WATER QUALITY STANDARDS

I. GENERAL STANDARDS (CONTD.)

Condition or Substance	Limitations
4. Color	Color producing substances shall be limited to concentrations which will not be detrimental to the benefical water use.
5. Coliform Bacteria (Total)	Public and Private Water Supplies $\leq$10,000/100 ml
6. Fecal Coliform	Public and Private Water Supplies $\leq$2000/100 ml (monthly arithmetic mean) Primary Body Contact $\leq$200/100 ml (monthly geomatric mean) based on not less than 5 samples over a 30-day period, nor shall more than ten percent of the samples during any 30-day rs period exceed 400/100 ml. Secondary Body Contact RecreationWate $\leq$1000/100 ml (monthly geometric mean) based on not less than 5 samples over a 30-day period, nor shall more than ten percent of the samples during any 30-day period exceed 2000/100 ml.

OKLAHOMA WATER QUALITY STANDARDS

I. GENERAL STANDARDS (CONTD.)

Condition or Substance	Limitations
7. Toxic Substance	The waters shall be maintained so that they will not be toxic to human, fish and wild life. Public and Private Raw Water Supplies Toxic substances not removable by ordinary water treatment techniques shall not exceed the limits specified in the National Interim Primary Drinking Water Regulations. Aquatic Life Water Use Designation Concentrations of non-persistent toxic substances shall not exceed 0.1 of the 96- hour TLM, or for persistent toxicants 0.05 of the 96-hour TLM, for the most sensitive indigenous species. The following substances, according to the standards, may have synergistic effects: Ammonia, cadmium, hexavalent chromium, trivalent chromium copper, cyanide, lead, mercury, nickel, selenium, silver and zinc.

OKLAHOMA WATER QUALITY STANDARDS

I. GENERAL STANDARDS (CONTD.)

Condition or Substance	Limitations
7. Toxic Substance (Contd.)	These substances shall not be present in concentrations to allow the cumulative relationship value (CRV) to exceed the numerical value of one (1). This CRV is expressed as follows: $CRV = \frac{Ca}{La} + \frac{Cb}{Lb} + \ldots \frac{Cn}{Ln}$ where Ca, Cb,...Cn are measured concentrations of each constituent at the end of the mixing zone, and La, Lb,...Ln, are the respective maximum permissible concentrations if each constituent were present alone.
8. Radioactive Materials	There shall be no discharge of radioactive materials in excess of the limits established in "Oklahoma Radiation Protection Regulations", 1969 or its latest revision.
9. pH (range)	6.5 - 8.5 (pH values less than 6.5 or greater than 8.5 must not be due to waste discharges).

OKLAHOMA WATER QUALITY STANDARDS

I. GENERAL STANDARDS (CONTD.)

Condition or Substance	Limitations
10. Temperature	Heat shall not be added to any streams in excess of the amount that will raise the temperature of the receiving water more than 5°F. The detail standards must be consulted to determine the maximum temperature for specific identified segments of state water.

II. SPECIAL STANDARDS

A. Effluent Dominant Streams (EDS)

An effluent dominant stream is a stream where the effluent volume is greater than the seven-day,two year low flow.

Condition or Substance	Limitation
1. Dissolved Oxygen (instream)	$\geq$2.0 mg/l (throughout stream length). Where the EDS joins perennial streams the dissolved oxygen shall not be less than 5.0 mg/l measured at the end of the mixing zone.

B. Mixing Zones

For perennial streams, the mixing zone extends downstream a distance equivalent to thirteen (13) times the width of the water at the point of effluent discharge.

1. Dissolved Oxygen (in mixing zone)	$\geq$4.0 mg/l

OKLAHOMA WATER QUALITY STANDARDS

III. BENEFICIAL USE DESIGNATIONS

A. Public and Private Water Supplies

B. Emergency Public and Private Water Supplies

C. Fish and Wildlife Propagation

D. Fish and Wildlife Propagation (Water Quality Dependent)

E. Agriculture (Livestock and Irrigation)

F. Hydro-Electric Power Generation

G. Receipt, Transport and Assimilation of Adequately Treated Wastes

H. Primary Body Contact Recreation

I. Secondary Body Contact Recreation

J. Navigation

K. Aesthetics

L. Small-Mouth Bass Fisheries (Excluding Lake Waters)

M. Trout Fisheries (Put-and-Take)

IV. BENEFICIAL USE LIMITATIONS

A. All streams and bodies of water which are designated as (a) in the specific water quality standards are protected by a prohibition of any new point source discharge of wastes, or increased load from an existing point source beyond the limits imposed by the National Pollutant Discharge Elimination System permits in effect at the time of adoption of these standards.

B. An streams designated as (b) and only those streams so designated are Effluent Dominant Streams.

V. OTHER REQUIREMENTS (Chapter V, Pollution Remedies)

A. General Permit Requirements (Chapter V, 505.1)

1. A permit from the Oklahoma Water Resources Board is required prior to any person discharging wastes resulting from any process of industry, manufacturing trade, processing, or recovery of any natural resource.

2. Exception

   Industries whose wastes are discharged directly to municipal treatment facilities, or whose waste discharges are subject to regulation by the Oklahoma Corporation Commission.

B. Unlined Lagons (Chapter V, 505.4)

1. Permits will not be issued for unlined earthen lagoons that hold toxic substances or petroleum products or those located on flood plains.

C. Lagoon Construction (Chapter V, 505.7)

1. All lagoons shall be constructed to prevent the entrance of run off waters resulting from precipitation.

2. All earthen lagoons shall be constructed with a minimum 2:1 side slope and a minimum top width of eight feet.

3. A free board of three feet shall be maintained on all lagoons which receive direct rainfall.

D. Guidelines for wastewater discharges into intermittent streams and storm sewers.

V. OTHER REQUIREMENTS (Chapter V, Pollution Remedies) (Contd.)

"The following list contains only the most common toxic substances and it should not be construed that this list is complete". (Chapter V, 545.1)

Constituent	Maximum Effluent Concentration in mg/1
1. Ammonia Nitrogen (as N)	2.5
2. Arsenic	0.2
3. Barium	5.0
4. Boron	1.0
5. Cadmium	0.03
6. Chromium-Hexavalent and/or Trivalent	1.0
7. Cobalt	1.0
8. Copper	0.10
9. Cyanide	0.025
10. Fluoride	1.0
11. Lead	0.1
12. Manganese	0.1
13. Mercury	0.005
14. Nickel	1.0
15. Oil and Grease	15 (essentially free of floating or emulsified oil or grease)
16. pH (range)	6.5 - 10
17. Phenols	0.2
18. Selenium	0.05
19. Silver	0.10
20. Zinc	1.0
21. Deoxygenating Waste (organic)	
a. BOD5	40 All treatment works should reduce the BOD of raw waste by at least 85%
b. Suspended Solids	45
22. Dissolved Oxygen (DO)	The effluent shall not cause the DO to be depressed below 5 mg/l
23. Phosphorus (as P)	1.0
24. Nitrate Nitrogen (as N)	20.0

OKLAHOMA: STANDARDS OF PERFORMANCE FOR STATIONARY SOURCES

Agency: Air Quality Service, Environmental Health Services,
State Department of Health

I. General Provisions

A. Definitions

1. "Air Contaminants" means the presence in the outdoor atmosphere of fumes, aerosol, mist, gas, smoke, vapor, particulate matter, or any combination thereof which create a condition of air pollution.

2. "Equivalent Opacity" means the degree to which an emission, other than gray or black smoke, is partially or wholly impervious to rays of light and causes obstruction of an observer's view, expressed as an equivalent of the obstruction caused by a gray or black smoke emission of a given density as measured by a Ringelmann Smoke Chart.

3. "Fuel-Burning Equipment" means the equipment, device, or contrivance, and all appurtenances thereto, including ducts, breechings, fuel-feeding equipment, ash-removal equipment, combustion controls, stacks and chimneys, used primarily to burn any fuel for the purpose of indirect heating in which the material being heated is not contacted by and adds no substance to the products of combustion.

4. "Particulate Matter" means any material that exists in a finely divided form as a liquid or a solid.

II. Visible Emission Standards

A. General Prohibition

No person owning or controlling the operation of any air contaminant source shall willfully, negligently, or through failure to provide necessary equipment or facilities or to take necessary precautions permit the emission from such air contaminant source of such quantities of air contamination as will cause a condition of air pollution.

B. Maximum Emission

20% opacity or No. 1, Ringlemann Chart (caused by fumes, aerosol, mist, gas, smoke, vapor, particulate matter, or any combination thereof)

C. Exceptions

1. Subsection B shall not apply to:

   a) Smoke or visible emissions emitted during the cleaning of a fire, the building of a new fire,

II. Visible Emission Standards (Contd.)

the blowing of soot from boilers, or other short-term occurrences, the shade or density of which is not darker than number three of the Ringelmann Chart or 60 percent opacity for a period aggregating no more than five minutes in any 60 consecutive minutes and/or no more than 20 minutes in an 24-hour period.

b) An emission where the presence of uncombined water is the only reason for failure to meet the opacity requirements in this section.

D. Incinerators (Refuse-burning Equipment)

1. Maximum emission or density
No. 1 on Ringelmann Chart (or equivalent opacity)

2. Exceptions

a) Visible emissions consisting of uncombined water droplets.

b) Smoke, not darker than No. 3 on the Ringelmann Chart for periods aggregating no more than five minutes in any hour or more than 20 minutes in any 24 hour period.

III. Standards for Fugitive Dust

A. Definitions

1. "Fugitive Dust" means solid airborne particulate matter emitted from any source other than a stack or chimney.

B. Standards

1. No person shall cause or permit the handling, transporting or disposition of any substance or material which is likely to be scattered by the air or wind, or is susceptible to being airborne, or to operate or maintain any premise, open area, right-of-way, storage pile of materials, vehicle, or construction, alteration or demolition operation, or any other enterprise which involves any material or substance susceptible to being airborne that would be classified as air pollution without taking reasonable precautions or measures to minimize atmospheric pollution.

2. No person shall cause or permit the discharge of any visible fugitive dust emissions beyond the property line on which the emissions originate in such a manner as to damage or to interfere with the use of adjacent properties, or cause air quality standards to be exceeded, or interfere with the maintenance of air quality standards.

III. Standards for Fugitive Dust (Contd.)

3. In areas designated as Air Quality Maintenance Areas for particulates the Commissioner may require specific precautions and may include, but shall not be limited to the following:

   a) Use, where possible, of water or chemicals for control of dust in the demolition of existing buildings or structures, construction operations, the grading of roads, driveways and parking lots or the clearing of land for commercial or industrial development;
   b) Application of water or suitable chemicals or some other covering on materials stockpiles and other surfaces which can create airborne dusts under normal conditions;
   c) Installation and use of hoods, fans and dust collectors to enclose and vent the handling of dusty materials or the use of water sprays or other acceptable measures to suppress the dust emission during handling. Adequate containment methods shall be employed during sandblasting or other similar operations;
   d) Removal as necessary from paved street and parking surfaces of earth or other material which have a tendency to become airborne;
   e) The planting and maintenance of vegetative ground cover as necessary.

IV. Emission Standards for Particulate Matter

A. Fuel Burning Equipment

1. Maximum emission*

for equipment ≤10 MM Btu/hr heat capacity:	0.60 lb/MM Btu heat input
for equipment of 100 MM Btu/hr heat capacity:	0.35 lb/MM Btu heat input
for equipment of 1,000 MM Btu/hr heat capacity:	0.20 lb/MM Btu heat input
for equipment ≥10,000 MM Btu/hr heat capacity:	0.10 lb/MM Btu heat input

* For extrapolation of values not given between 10 and 10,000 MM Btu/hr heat capacity see Figure 1 of Regulation No. 6 in the Oklahoma air regulations. No formula for calculating such values is included therein.

IV. Emission Standards for Particulate Matter (Contd.)

B. Industrial and Other Processes and Operations

1. Affected facilities: any operation, process, or activity except fuel-burning equipment and incinerators (covered in other subsections).

2. Definitions

a) "Process Weight" means the weight of all materials introduced in a source operation, including solid fuels, but excluding liquids and gases used solely as fuels and excluding air introduced for the purposes of combustion. "Process weight rate" means a rate established as follows:

i) For continuous or long-run, steady-state operations, the total process weight for the entire period of continuous operation or for a typical portion thereof divided by the number of hours of such period or portion thereof.

ii) For cyclical or batch source operations, the total process weight for a period which covers a complete or an integral number of cycles divided by the hours of actual process operation during such period.

3. Maximum emission

use:

for process weight rates $\leq$60,000 lb/hr: $E= 4.10P^{0.67}$

for process weight rates >60,000 lb/hr: $E= 55.0P^{0.11}-40$

where (in both cases): E is rate of emission in lb/hr; and P is process weight in tons/hr.

C. Incinerators

1. Maximum emission

use for refuse charging rates $\geq$100 lb/hr:

$$Y = 0.01221X^{.7577}$$

where: X is refuse charging rate in lb/hr;
Y is allowable emission in lb/hr

(for <100 lb/hr refuse charging rate use curve on Figure 1 of Regulation 5, Oklahoma Air Pollution Control Regulations)

IV. Emission Standards for Particulate Matter (Contd.)

2. Solid fuels charged shall be considered as part of refuse weight charged but gaseous fuels and No.'s 1 and 2 fuel oil shall not be so considered.

3. Refuse shall be burned in a multiple chamber type incinerator (or equally effective approved equipment) which shall also be equipped with the following:

   a) an auxiliary burner for maintaining a temperature of at least 800°F in the primary combustion chamber.
   b) a secondary burner for use when necessary to eliminate smoke.

V. Emission Standards for Sulfur Compounds

A. Fuel-burning Equipment

1. Maximum emission of SO_x (expresed as SO_2)
(values are maximum two-hour average)

   a) gas fired: 0.2 lb/MM Btu heat input
   b) liquid fired: 0.8 lb/MM Btu heat input
   c) solid fired: 1.2 lb/MM Btu heat input
   d) solid and liquid fuels burned simultaneously - use:

$$E = \frac{Y(0.80)+Z(1.2)}{Y+Z}$$

where: E is the maximum rate of emission, lb/MM Btu heat input (two hour average)
Y is the % of total heat input from liquid fuel; and
Z is the % of total heat input from solid fuel

B. Sulfur Recovery Plants

1. Maximum emission of SO_x (expressed as SO_2)

natural gas processing: (in conjunction with)	100 lb/hr, maximum two-hour average; but not more than 20 lb/T of sulfur processed, maximum two hour average.
other processes: (in conjunction with)	20 lb/T of sulfur processed, maximum two-hour average.

C. Hydrogen Sulfide (H_2S) Standards

1. Petroleum and Natural Gas Processes

V. Emission Standards for Sulfur Compounds (Contd.)

a) Standards. Emission of H_2S to the atmosphere shall be prohibited without removal of the H_2S from the exhaust gas or oxidation of the H_2S to SO_2 in a system insuring complete oxidation of the H_2 at all times and with discharge then being from a stack at least 50 feet in height. Both removal and/or oxidation systems shall meet the following requirements:
   i) 0.3 lb/hr maximum emission of H_2S, two-hour average; and
   ii) 95% removal of H_2S in the exhaust gas

b) A system for direct oxidation of H_2S to SO_2 as mentioned in C.1.a. which would allow in excess of 100 lb/hr of SO_x (expressed as SO_2), two-hour average, shall not be allowed unless there is a prior removal step (meeting the SO_x limitations of B.1. herein).

VI. Emission Standards for Nitrogen Oxides (NO_x)

A. Fuel Burning Equipment

1. Affected facilities: installations with rated heat inputs of 50 MM Btu/hr or more.

2. Maximum emissions (NO_x expressed as NO_2)

Gas fired: 0.20 lb/MM Btu heat input, 2 hr. average

Liquid fired: 0.30 lb/MM Btu heat input, 2 hr. average

Solid fossil fuel fired: 0.70lb/MM Btu heat input, 2 hr. average

VII. Emission Standards for Carbon Monoxide (CO)

A. Emissions of CO from any petroleum or natural gas process shall be reduced by use of complete secondary combustion of the waste gas generated. Removal of 93% or more of the CO generated will be considered complete secondary combustion.

VIII. Emission Standards for Hazardous Air Contaminants

A. Definitions

1. "Hazardous air contaminants" means those air pollutants defined as "hazardous air pollutants" in Section 112 of the U. S. Clean Air Act as amended December 1970 and any smoke, dust, noxious or obnoxious acids, fumes, oxides, gases, mists, vapors, or other solid, liquid, or gaseous matter which, when emitted into the atmosphere in concentrations allowed for other air

contaminants, are still capable of injuring human, plant, or animal life or causing damage to property (therefore more harmful than ordinary dusts or particulate matter).

B. Emission Standards

The "National Hazardous Pollutant Emission Standards" as published by the U. S. Environmental Protection Agency are adopted by reference and incorporated herein (40CFR, Part 61). Of these incorporated standards, those for mercury emissions and beryllium emissions are relevant to this project. A synopsis of the Federal hazardous pollutant regulation for mercury and beryllium may be found in the Federal EPA Regulations and Standards part of this report.

IX. Standards for Organic Materials

A. Definitions

1. "Air pollution" is the presence in the outdoor atmosphere of one or more air contaminants in sufficient quantities and of such characteristics and duration as tend to or may be injurious to human, plant or animal life or to property, or which interferes with the comfortable enjoyment of life and property, excluding, however, all conditions pertaining to employer-employee relations.

2. "Effluent water separator" means any tank, box, sump or other container in which any material compound floating on or entrained or contained in water entering such tank, box, sump or other container is physically separated and removed from such water prior to outfall, drainage or recovery of such water.

3. "Organic materials" means chemical compounds of carbon excluding carbon monoxide, carbon dioxide, carbonic acid, metallic carbides, metallic carbonates, and ammonium carbonate.

B. Storage

1. It shall be prohibited to build, install, or permit the building or installation of any stationary tank, reservoir or other container of more than 40,000 gallons capacity which will be used for storage of any organic materials unless such tank, reservoir or other container is to be a pressure tank capable of maintaining working pressures sufficient at all times to prevent organic vapor or gas loss to the atmosphere or is designed and equipped with one of the following vapor-loss control devices:

a) a floating roof, consisting of pontoon type, internal floating cover or double-deck type roof, which will rest on the surface of the liquid contents and be equipped with a closure seal, or seals, to close the space between the roof edge and tank wall. Such floating roofs shall not be appropriate control devices if the organic materials have a vapor pressure of 11 psia or greater under actual conditions. All gauging and sampling devices shall be gas-tight except when gauging or sampling is taking place; or

b) a vapor-recovery system consisting of a vapor-gathering system capable of collecting 85 percent or more of the uncontrolled organic material that would otherwise be emitted to the atmosphere; and vapor-disposal system capable of processing such organic material so as to prevent its emission to the atmosphere; and with all tank gauging and sampling devices gas-tight except when gauging or sampling is taking place; or

c) other equipment or means of equal efficiency for purposes of air pollution control as may be approved by the Commissioner of Health.

2. No person shall build, install, or permit the building or installation of a stationary organic material storage tank with a capacity of 250 gallons or more unless such tank is equipped with a permanent submerged fill pipe or with an organic material vapor-recovery system as required in subsection B.1. above.

C. Loading Facilities

1. Loading facilities with through-put of greater than 40,000 gallons/day: No person shall build, install or permit the building or installation of a stationary organic material loading facility having a through-put greater than 40,000 gallons per day from its aggregate loading pipes unless such loading facility is equipped with a vapor collection and disposal system or is of the bottom loading type with closed hatches.

a) When loading in a vapor collection and disposal system is to be effected through the hatches of a tank truck or trailer with a loading arm equipped with a vapor- collecting adaptor, pneumatic, hydraulic or other mechanical means shall be provided to force a vapor- tight seal between the adaptor and the hatch.

IX. Standards for Organic Material (Contd.)

b) Means shall be provided in either system above to prevent organic material drainage from the loading device as it is removed from any tank truck or trailer or to accomplish complete drainage before removal.

c) When loading is to be effected through means other than hatches, all loading and vapor lines shall be equipped with fittings which make vapor-tight connections and either must be closed when disconnected or close automatically when disconnected.

d) The vapor-disposal portion of the system shall consist of the following:

i) a vapor-liquid absorber system with a minimum recovery efficiency of 90 percent by weight (of all the organic material vapors and gases entering such disposal system); or

ii) a variable-vapor-space tank, compressor, and fuel gas system of sufficient capacity to receive all organic material vapors and gases displaced from the tank trucks and trailers when loaded.

2. Loading facilities with through-put equal to or less than 40,000 gallons per day: No person shall build, install, or permit the building or installation of a stationary organic material loading facility having a through-put of 40,000 gallons per day or less from its aggregate loading pipes unless each is equipped with a system for submerged filling of tank trucks or trailers and to operate in such a manner that a 97 percent submergence factor is maintained. This subsection C.2. shall apply to any facility which loads organic materials into any tank truck or trailer designed for transporting organic materials and having a capacity in excess of 200 gallons.

D. Effluent Water Separators

It shall be prohibited to build, install, or permit the building or installation of a single or multiple compartment organic material water separator which receives effluent water containing 200 gallons a day or more of any organic material from any equipment processing, refining, treating, storing or handling organic materials unless the compartment receiving said effluent water is equipped with one of the following vapor-loss control devices:

IX. Standards for Organic Material (Contd.)

1. A container having all openings sealed and totally enclosing the liquid contents. All gauging and sampling devices shall be gas-tight except when gauging or sampling is taking place. The oil removal devices shall be gas-tight except when manual skimming, inspection and/or repair is in progress; or

2. A container equipped with a floating roof consisting of a pontoon type, double-deck type roof or internal floating cover, which will rest on the surface of the contents and be equipped with a closure seal or seals to close the space between the roof edge and container wall. All gauging and sampling devices shall be gas-tight except when gauging or sampling is taking place. The oil removal devices shall be gas-tight except when manual skimming, inspection and/or repair is in progress; or

3. A container equipped with a vapor-recovery system consisting of a vapor gathering system capable of collecting the organic material vapors and gases discharged and a vapor disposal system capable of processing such organic material vapors and gases so as to prevent their emission to the atmosphere. All tank gauging and sampling devices shall be gas-tight except when gauging or sampling is taking place. The organic material removal devices shall be gas-tight except when manual skimming, inspection and/or repair is in progress; or

4. Containers equipped with controls of equal efficiency provided such equipment has prior approval by the Commissioner of Health.

E. Pumps and Compressors

It shall be prohibited to build, install, or permit the building or installation of any pump or compressor handling organic material compounds unless rotating pumps and compressors are equipped with mechanical seals or other equipment of equal efficiency and reciprocating pumps and compressors are equipped with packing glands properly installed such that the emissions from the drain recovery system are limited to two cubic inches of liquid organic material in any 15 minute period at standard conditions per pump or compressor.

IX. Standards for Organic Materials (Contd.)

F. Waste Gas Disposal

Except where inconsistent with the "Minimum Federal Safety Standards for the Transportation of Natural and Other Gas by Pipeline" or any other State of Oklahoma environmental regulations, it shall be prohibited to emit organic gases to the atmosphere from a vapor recovery blow-down system unless these gases are burned by smokeless flares or equally effective control device as may be approved by the Commissioner of Health.

G. Fuel-Burning and Refuse-Burning Equipment

It shall be prohibited to cause or allow the emission of organic materials from any fuel-burning or refuse-burning equipment. All such equipment shall be operated so as to minimize such emissions; among other things, such operation shall assure that the equipment is not overloaded, that it is properly maintained, and that temperature and available air are sufficient to provide essentially complete combustion.

H. Exemptions

Organic materials as used in subsections B. through G. above will not include:

1. Methane (CH_4) or any material otherwise included which has a vapor pressure of less than 1.5 pounds per square inch absolute under actual storage conditions.

X. Standards for Organic Solvents

A. Definitions

1. "Organic solvents" means organic materials including diluents and thinners which are liquids at standard conditions and which are used as dissolvers, viscosity reducers or cleaning agents, except that such materials which exhibit a boiling point higher than 220°F at 0.5 millimeter of mercury absolute pressure or having an equivalent vapor pressure shall not be considered to be solvents unless exposed to temperatures exceeding 220°F.

X. Standards for Organic Solvents (Contd.)

2. "Photochemically reactive solvent" means any solvent with an aggregate of more than 20 percent of its total volume composed of the chemical compounds classified below or which exceeds any of the following individual percentage composition limitations, referred to the total volume of solvent:

a) a combination of hydrocarbons, alchols, aldehydes, esters, ethers, or ketones having an olefinic or cyclo-olefinic type of unsaturation: 5%;
b) a combination of aromatic compounds with either eight or more carbon atoms to the molecule except ethylbenzene: 8%;
c) a combination of ethylbenzene, ketones having branched hydrocarbon structures, trichloroethylene or toluene: 20%.

B. Heat Drying

It shall be prohibited to cause or allow the discharge into the atmosphere of more than 15 pounds of organic materials in any one day or more than 3 pounds in any one hour from any article, machine, equipment or other contrivance in which any organic solvent or any material containing organic solvent comes into contact with flame or is heat cured, or heat polymerized in the presence of oxygen, except as provided in subsections E. and F. below.

C. Other Solvent Uses

It shall be prohibited to cause or allow the discharge into the atmosphere of more than 40 pounds of organic materials in any one day or more than 8 pounds in any one hour from any article, machine, equipment or other contrivance for employing, applying, evaporating or drying any photochemically reactive solvent or material containing such photochemically reactive solvent except as provided in subsection E. and F. below. Emissions resulting from heat curing or heat polymerizing as described in subsection B. shall be excluded from determination of compliance with this subsection.

D. Use of Non-reactive Solvents

It shall be prohibited to discharge into the atmosphere more than 3,000 pounds of organic materials in any one day or more than 450 pounds in any one hour from any article, machines, equipment or other contrivance in which any non-photochemically reactive organic solvent or any

X. Standards for Organic Solvents (Contd.)

material containing such solvent is employed or applied unless said discharge has been reduced by at least 85 percent. Emissions resulting from heat curing or heat polymerizing as described in subsection B. shall be excluded from determination of compliance with this subsection D.

E. Alternate Standard

Emissions in excess of those permitted by subsections B. and C. above are allowable if both the following conditions are met:

1. Emissions that would result in the absence of control are reduced by:
    a) 90%, by incineration; or
    b) 85%, by absorption or other process of equivalent reliability and effectiveness; and
2. No air pollution as defined in section IX results.

F. Exceptions

The provisions of subsections B. through D. above shall not apply to:

1. The use of a non-photochemically reactive solvent as defined and published by the Commissioner of Health. (All organic materials as defined in this regulation have been found to be reactive to a certain degree. Substitution of certain quantities of non-reactive solvents allowed in subsections B.-D. above based on comparisons of reactivity of the various organic compounds may be approved by the Commissioner.)

OKLAHOMA SOLID WASTE MANAGEMENT RULES AND REGULATIONS

Basis: Title 63, O.S. 1971, Sec. 2251-2265, Rules and Regulations, Oklahoma Department of Health Bulletin No. 0524 (July 1973)

Agency: Oklahoma State Department of Health, Environmental Health Services Sanitation Division, Solid Waste Management Section.

Note:

1. Some of the solid waste regulations are being revised and rewritten.

2. There are no specific regulations which are directly applicable to the coal procesing industry.

3. The Oklahoma State Department of Health Sanitation Service, Solid Waste Management Division has published Guideline #2, Sanitary Landfill Standards Compliance and Reasons. This guideline details what would be considered as compliance with the regulation.

4. A permit is required for a solid waste disposal site other than a person disposing of his own solid waste upon his own land so long as such disposal does not create a nuisance or a hazard to public health.

I. Disposal of Hazardous Waste (other than radioactive waste)

A. Approval of Site

1. No hazardous wastes shall be deposited in a solid waste disposal site unless the facility has been approved for the disposal of hazardous waste.

B. Lining for Solid Waste Disposal Site

1. An impervious lining or membrane may be required by the Department. The plans and specifications for such a lining must be approved by the Department prior to installation or use.

2. The use of natural or specific clays to develop any necessary lining is permitted providing:

   a. that the lining is at least 5 feet thick, and

   b. that the permeability index is no greater than 10^{-8} cm/sec.

I. Disposal of Hazardous Waste (Contd.)

C. Standards

1. Soil Characteristics

    a. The soil shall meet the classification of a clay consisting of no more than 70% of particles larger than 0.002 millimeters. The soils shall be of inorganic nature and origin.

    b. The permeability shall be no greater than 10^{-6} cm/sec. (0.0014 in/hr.)

    c. The testing for permeability shall be done on samples taken at each 10 feet vertical depth, and performed according to the latest ASTM procedure or equivalent.

D. Security

1. All sites where hazardous wastes are accepted shall be provided with high-security type fencing with locking gates.

2. Adequate signs of a permanent weather-proof type shall be permanently posted.

    a. One sign giving the name of the site and listing or describing the materials or classes of materials which may be disposed of at the site.

    b. Signs around the parimeter, such signs shall describe the site or facility use and provide a warning for unauthorized entrance.

3. Unloading shall be controlled so as not to produce hazardous air-borne contamination.

4. Monitoring of the Site

    a. Monitoring procedures shall be developed as required by the Department in regard to possible ground water, surface water and air contamination.

OKLAHOMA SOLID WASTE MANAGEMENT RULES AND REGULATIONS

II. Definitions

A. "Solid waste" means all putrescible and non-putrescible refuse in solid or semi solid form including, but not limited to, garbage, rubbish, ashes or incinerator residue....construction wastes, solid or semi solid commercial and industrial wastes and hazardous wastes including explosives, pathological wastes, herbicide and pesticide wastes.

B. "Disposal site" means any place at which solid waste is dumped, abandoned, accepted or disposed of by incineration, land filling, composting or any other method.

PENNSYLVANIA WATER QUALITY

Basis: Title 25, Rules and Regulations, Article II, Water Resources, Chapter 95, Waste Water Treatment Requirements and Chapter 97, Industrial Wastes, Chapter 100, Mine Resources Management

Agency: Department of the Environment

I. WASTE WATER TREATMENT REQUIREMENTS (Article II, Chapter 95)

A. General Requirements

1. Specific treatment requirements shall be determined for each waste discharge.

2. Any industrial, public or private project or development which would constitute a new source of pollution or an increased source of pollution to high quality waters shall be required to provide the highest and best practicable means of waste treatment.

B. Treatment for Bio-degradable Wastes

1. All bio-degradable wastes shall be given a minimum of secondary treatment or its equivalent for industrial wastes.

2. Secondary treatment is that treatment which shall accomplish the following:

    a. Reduce the organic waste load as measured by the biochemical oxygen demand test by at least 85% during May 1 to October 31, and at least 75% during remainder of the year based on 5 conservative days average of values.

    b. Remove practically all of the suspended solids.

    c. Provide effective disinfection to control disease producing organisms.

    d. Provide satisfactory disposal of sludge.

    e. Reduce the quantities of oils, greases, acids, alkalis, toxic, taste and odor producing substances, color and other substances harmful to the public interest to levels which shall not pollute the receiving stream.

PENNSYLVANIA WATER QUALITY

I. WASTE WATER TREATMENT REQUIREMENTS (Article 11, Chapter 95) (CONTD.)

C. Treatment for Non-Bio-Degradable Wastes

1. An equivalent of the treatment as specified in 2 above shall be required for non-bio-degradable wastes. Where specific requirements are not made available they shall be determined on an individual basis.

D. Effective Disinfection

1. Effective disinfection shall be the production of an effluent which will contain a concentration not greater than 200/100 ml fecal coliforms as a geometric average value nor greater than 1000 ml/100 ml in more than 10% of the samples tested.

II. INDUSTRIAL WASTES (Article II, Chapter 97)

A. Degree of Treatment Required

1. In issuing orders for the abatement or treatment of polluting wastes, the Department shall set forth the degree of treatment required in terms of the treatment of sewage and shall specify that in the case of industrial wastes they shall be given equivalent treatment.

B. Mineral Preparation

1. Coal Washeries

   a. Operators of all coal washeries, whether a closed system or not, shall submit an application and plans to secure a permit prior to operation of the facilities.

2. Discharge to surface waters

   a. Wastes discharges to surface waters from mineral preparation, handling or processing plants shall meet the following standards:

II. INDUSTRIAL WASTES (Article II, Chapter 97) (CONTD.)

Substance	Limitation
Suspended Solids	$\leq$200 mg/l
Acid Wastes	No discharge
pH (range)	6.0 - 9.0
Dissolved Iron	7.0 mg/l

b. When surface waters are used in the mineral preparation plant, the quality of the effluent need not exceed the quality of raw water supply (depending upon location of raw water supply) if the source of raw water supply would normally drain to the point of effluent discharge.

3. Discharges to Underground Waters.

   a. Waste discharges to underground waters shall meet one of the following conditions:

      (1). The quality standards set forth in a (2), (3), (4) above.

      (2). That the wastes shall be discharged in accordance with Underground Disposal as shown below in C.

4. Drainage from Active Mineral Refuse.

   a. Drainage from active mineral refuse piles, mineral stockpiles and related facilities (other than seasonal surface runoff caused by precipitation on the refuse and stockpiles) shall meet the quality standards as shown in B.2. above (Discharge to Surface Waters).

II. INDUSTRIAL WASTES (Article II, Chapter 97)(CONTD.)

5. Disposal of Solids from Water-Born Wastes.

   a. Disposal of solids which are removed from waterborn wastes shall be such that they are not washed, conveyed or otherwise deposited into the surface waters of the state.

C. Underground Disposal

1. Potential Pollution

   a. The disposal of wastes, including storm water runoff, into the underground is considered as potential pollution unless the disposal is close enough to the surface so that the wastes will be absorbed in the soil and acted upon by naturally present bacteria before reaching the underground or surface waters.

2. Discharge into Mines

   a. Discharge of inadequately treated wastes, except coal fines, into the underground workings of an active or abandoned mine shall be prohibited.

3. Discharge into Abandoned Wells

   a. Discharge of wastes into abandoned wells shall be prohibited.

4. Disposal in Underground Horizons

   a. Only allowed when it can be shown to the Department that it is improbable that the disposal would result in any pollution.

D. Heat Pollution

1. Prohibition

II. INDUSTRIAL WASTES (Article II, Chapter 97) (CONTD.)

a. The temperature of the waters of the state shall not be artifically increased in amounts which shall be injurious to public health or animals or aquatic life or prevent the use of the water for its intended purpose.

2. Allowable Discharges

a. The heat content of discharges shall be limited so as not to raise the temperature of the entire stream at the point of discharge 5°F above ambient temperature or a maximum of 87°F which ever is less, nor change the temperature by more than 2°F during any one-hour period, assuming complete mixing.

E. Other Wastes

1. Phenolic Wastes

a. Phenolic wastes, comprising phenols, creosols, tar acids and similar taste-and odor producing substances shall be COMPLETELY eliminated from wastewaters discharged or permitted to flow into the Ohio River and its tributaries within the state.

2. Oil-bearing Wastewaters

a. Wastewaters shall show no more than a slight iridescence and shall at no time contain more than 30 ppm of oil.

3. Cyanides

a. There shall, under no circumstances, be no discharge, in any amount, of cyanides or other cyanogen compounds into the waters of the state.

III. MINE RESOURCES MANAGEMENT (Article II, Chapter 100)

A. Definitions

III. MINE RESOURCES MANAGEMENT (Article II, Chapter 100) (CONTD.)

1. "Coke Refuse" - means any waste coal, rock, shale, slurry, any related materials associated with or near a coal seam, which are either brought above ground or otherwise removed from a coal mine in the process of mining coal, or which are separated from coal during the cleaning or preparation operations.

2. "Coal Refuse Disposal Pile" - means any general area or plot of land used as a place for dumping, storage or disposal of coal refuse.

3. "Coal Refuse Disposal Pile" - means any deposit of coal refuse on or buried in the earth and intended as permanent disposal of or long-term storage of such material, but not including coal refuse deposited within amine itself or coal refuse never removed from a mine. Continuous deposits of coal refuse shall be considered as a single coal refuse disposal pile.

4. "Buffer Zone" - means land surrounding the immediate perimeter of a coal refuse disposal area upon which no refuse will be deposited and will therefore be available for access, the construction of diversion and collection catches, sedimentation ponds and such other uses as may arise in the operation of the area.

B. General Requirements

1. Permit is required to establish or operate a coal refuse disposal area or enter upon an abandoned coal refuse disposal area for the purpose of disposal of coal refuse.

C. Prevention and Control of Water Pollution

1. Runoff from the top of the coal refuse disposal pile shall not be allowed to discharge freely onto the slopes. Diversion facilities shall be constructed to allow the controlled flow of the runoff. The top of the pile shall be graded with shallow slopes falling away from the edge to concentrate the runoff in these diversion facilities.

III. MINE RESOURCES MANAGEMENT (Article II, Chapter 100) (CONTD.)

2. Water runoff from the adjacent area shall be directed away from the coal refuse pile.

3. The following requirements must be met to insure the stability of the coal refuse disposal area.

   a. Impoundments shall not be located on coal refuse disposal areas except as approved by the Department.

   b. A minimum clear space of 50 feet shall be provided from the outer perimeter of any coal refuse pile unless otherwise approved.

   c. Coal refuse may not be deposited in layers exceeding two feet in depth.

   d. Slopes of coal refuse disposal piles shall not exceed 15 per cent or 9 degrees. The maximum slope to be approved, in any case, shall not exceed 33 percent or 18 degrees.

   e. The height shall be limited and other measures taken as necessary to insure the stability of the slopes.

   f. The maximum height of new coal refuse disposal piles shall be limited to 100 feet above the average area elevation except as otherwise approved.

D. Operating Requirements

1. Even though the department has regulations governing the operation of coal refuse disposal areas these regulations are not set forth because they are applicable to the day to day operation of the refuse area and provide no additional design criteria.

PENNSYLVANIA: STANDARDS OF PERFORMANCE FOR STATIONARY SOURCES

Agency: Department of Environmental Resources

I. General Provisions

A. Definitions

1. "Air basin" means a geographic area of the Commonwealth of Pennsylvania as further delineated by component political subdivisions in the Pennsylvania air regulations.
2. "Combustion unit" means any stationary equipment used to burn fuel primarily for the purpose of producing power or producing heat by indirect heat transfer.
3. "Fugitive air contaminant" means any air contaminant emitted into the outdoor atmosphere in any manner other than through a flue.
4. "Process" means any method, reaction, or operation wherein materials are handled or whereby materials undergo physical change or chemical change. A process includes all of the equipment and facilities necessary for the completion of the transformation of the materials to produce a physical or chemical change.
5. "Volatile organic compound" means any compound containing carbon and hydrogen or containing carbon and hydrogen in combination with any other element and which has a vapor pressure of at least 1.5 psia under actual storage conditions.

II. Visible Emission Standards

A. Maximum Emission

1. Opacity shall not be 20% or greater for a period or periods aggregating more than 3 minutes/hr; and
2. shall not be 60% or greater at anytime.

B. Exceptions

1. The limitations of A. above shall not apply when the presence of uncombined water is the only reason for failure of the emission to meet such limitations.
2. The limitations of A. above shall not apply to emissions from sources specified in III.A.1. herein (relating to fugitive dust).

III. Standards for Fugitive Air Contaminants and Fugitive Particulates

A. Fugitive Air Contaminants

1. It shall be prohibited to cause or allow emission into the atmosphere of any fugitive air contaminant from any source except from:

   a) Construction or demolition of buildings or structure
   b) Grading, paving and maintenance of roads and streets.
   c) Use of roads and streets. (Emissions from material in or on trucks, railroad cars and other vehicular equipment shall not be considered as emissions from use of roads and streets).
   d) Stockpiling of materials.
   e) Other sources determined by the Department to be of minor significance with respect to the achievement and maintenance of ambient air quality standards or with respect to causing air pollution.

2. Reasonable actions to prevent particulate matter from becoming airborne shall be taken by any person responsible for a source listed in A.1.a)-e). Such actions shall include, but not be limited to, the following:

   a) Use, where possible, of water or chemicals for control of dust in the demolition of buildings or structures, construction operations, the grading of roads or the clearing of land.
   b) Application of asphalt, oil, water or suitable chemicals on dirt roads, material stockpiles, and other surfaces which can give rise to airborne dusts.
   c) The paving and maintenance of roadways.
   d) The prompt removal of earth or other material from paved streets onto which earth or other material has been transported by trucking or earth moving equipment, erosion by water, or other means.

B. Fugitive Particulate Matter

1. It shall be prohibited to cause or allow fugitive particulate matter to be emitted from any of the sources specified in A.1.a)-e) above if such emissions are either:

   a) visible, at any time, at the point such emissions pass outside the source property line, irrespective of the concentration of particulate matter; or

III. Standards for Fugitive Air Contaminants (Contd.)

b) not visible where such emissions pass outside the source property line, but the average concentration above background of three samples of such emissions at any point outside property line exceeds 150 particles per cubic centimeter.

IV. Emission Standards for Particulate Matter

A. Fuel Burning Equipment (Combustion Units)

1. Maximum Emissions (lb. of particulates)

for heat input >2.5 MM Btu/hr <50 MM Btu/hr:
0.4 lb/MM Btu of heat input

for heat input ≥ 50 MM Btu/hr <600 MM Btu/hr:
use: $A = 3.6\bar{E}^{-0.56}$

where: A = allowable emissions in lbs/MM Btu of heat input; and
E = heat input in MM Btu/hr to the combustion unit

for heat input ≥ 600 MM Btu/hr:
0.1 lb/MM Btu of heat input

B. Incinerators

1. Maximum Concentration in Effluent Gas
0.1 gr/DSCF of effluent gas, corrected to 12% CO_2

C. Processes (Other than Incinerators and Fuel Burning Equipment)

1. General: All sources not listed in C.2. below
a) Maximum Emission

for effluent gas rates of $<150{,}000$ DSCFM:
0.04 gr/DSCF effluent gas

for effluent gas rates of $\geq 150{,}000$ DSCFM $<300{,}000$ DSCFM:
use: $A = 6000E^{-1}$

where: A = Allowable emissions in gr/DSCF; and
E = Effluent gas flow rate in DSCFM

for effluent gas rates of $\geq 300{,}000$ DSCFM:
0.02 gr/DSCF

IV. Emission Standards for Particulate Matter (Contd.)

2. Specified Processes
   a) This subsection is applicable only to the following processes:
      i) Crushers, grinders, or screens (20 lb/T of feed, Process Factor F)
      ii) Coal drying (2 lb/T of product, Process Factor F)
      iii) Coal dry-cleaning (2 lb/T of product, Process Factor F)
      iv) Petroleum refining; catalytic cracking (40 lb/T of liquid feed, Process Factor F)
   b) Maximum Emissions
      Use the greater of 0.02 gr/DSCF concentration in effluent gas or:

$$A = 0.76E^{0.42}$$

where: E = F(W) in lb/hr (Emission Index);
F = Process Factor in lbs/T (value and relevant stream in subsection 2. above); and
W = Charging or Production Rate in T/hr (consistent with relevant stream for F)

V. Emission Standards for Sulfur Oxides (SO_x)

A. General

1. Affected facilities: This subsection A. applies to all sources except those subject to other subsections of this section V. or these air regulations with respect to control of sulfur compound and sulfur oxide emissions.

2. SO_x Emission Standard

   500 ppm (by vol., dry), maximum SO_x concentration (expressed as SO_2) in effluent gas

B. Combustion Units - General

1. Affected facilities: This subsection B. applies to all combustion units in all the Pennsylvania air basins except for sources covered by subsection C. of this section.

V. Emission Standards for Sulfur Oxides (SO_x) (Contd.)

2. Maximum Emissions (SO_x, expressed as SO_2)

a) $\leq$ 2.5 MM Btu/hr of heat input:
4.0 lb/MM Btu of heat input
b) $>$ 2.5 MM Btu/hr $<$50 MM Btu/hr of heat input:
3.0 lb/MM Btu of heat input
c) $\geq$ 50 MM Btu/hr $<$2000 MM Btu/hr of heat input:
use: $A = 5.1E^{-0.14}$
where: A is allowable emissions in lb/MM Btu of heat input; and
E is heat input to the combustion unit in MM Btu/hr
d) $\geq$ 2000 MM Btu/hr of heat input:
1.8 lb/MM Btu of heat input

C. Combustion Units - Specified Air Basins

1. Affected facilities: This subsection C. applies to all combustion units in the Allegheny County, Beaver Valley Monongahela Valley, and Southeast Pennsylvania air basins.

2. Maximum Emissions (SO_x, expressed as SO_2)

a) $>$ 2.5 MM Btu/hr 50 MM Btu/hr of heat input:
1.0 lb/MM Btu of heat input
b) $\geq$ 50 MM Btu/hr $<$ 2000 MM Btu/hr of heat input:
use: $A = 1.7E^{-0.14}$
where: A and E are as defined in B. 2. c) above.
c) $\geq$ 2000 MM Btu/hr of heat input:
0.6 lb/MM Btu of heat input

D. Sulfur Recovery Plants

The maximum allowable emission rate to the atmosphere for sulfur oxides, expressed as SO_2, shall be determined by the formula:

$$A = 0.32E^{-0.5}$$

where: A = allowable emissions in lbs of SO_x (as SO_2)/lb of sulfur compounds (as S) in the feed gases; and
E = recovery plant rating in long tons of S/day.

VI. Odorous Emission Standards

A. It shall be prohibited to cause or allow emissions of hydrogen sulfide (H_2S) or mercaptans into the

VI. Odorous Emission Standards (Contd.)

atmosphere without incinerating such gases or vapors at 1200°F (minimum) for at least 0.3 seconds before emission.

B. Alternate methods to incineration as specified in A. above may be used if it is shown to the satisfaction of the Department that such techniques are at least as effective as such incineration in controlling odorous emissions.

C. It shall be prohibited to emit from any source whatsoever, regardless of compliance with subsection A, malodorous air contaminants such that odor or odors are detectable beyond the property line of the emission source.

VII. Standards for Organic Compounds

A. Affected facilities: All sources within the Allegheny County, Beaver Valley, Monohgahela Valley and Southeast Pennsylvania air basins.

B. General. Techniques other than those specified in subsections C., D., E., and F. below may be used to comply with the requirements of these subsections if shown to the satisfaction of the Department to be equivalent to or better than the techniques specified therein with respect to control of organic emissions.

C. Storage

1. It shall be prohibited to place, store, or hold in any stationary tank, reservoir or other container rated at more than 40,000 gallons any volatile organic compounds unless such tank, reservoir, or other container is a pressure tank capable of maintaining working pressures sufficient at all times to prevent vapor or gas loss to the atmosphere or is designed and equipped with one of the following vapor loss control devices:

a) A floating roof, consisting of a pontoon type roof, double deck type roof or internal floating cover, which shall rest on the surface of the liquid contents and be equipped with a closure seal or seals to close the space between the roof edge and tank wall. This control equipment shall not be permitted if the volatile organic compounds have a vapor pressure of 11.0 PSIA or greater under actual storage conditions. All tank gauging or sampling devices shall be gas-tight except when gauging or sampling is taking place.

b) A vapor recovery system, consisting of a vapor gathering system capable of collecting the volatile organic compound vapors and gases discharged and a

VII. Standards for Organic Compounds (Contd.)

vapor disposal system capable of processing such volatile organic vapors and gases so as to prevent their emission to the atmosphere. All tank gauging and sampling devices shall be gas-tight except when guaging or sampling is taking place.

D. Loading Facilities

1. It shall be prohibited to cause or allow the loading of any volatile organic compound into any vehicular tank rated at more than 200 gallons from any loading facility which loads 20,000 or more gallons in any one day, unless such loading facility is equipped with a vapor collection and disposal system as described in subsection C.1.b) above.

2. It shall be prohibited to cause or allow the loading of any volatile organic compound into any vehicular tank rated at more than 200 gallons from any loading facility which loads 20,000 or more gallons in any one day, unless such loading facility is equipped with a loading arm with a vapor collection adaptor and pneumatic, hydraulic, or other mechanical means to force a vapor-tight seal between the adaptor and the hatch of the tank. A means shall be provided to prevent liquid organic compounds drainage from the loading device when it is not connected to the hatch, or to accomplish complete drainage before such removal. When loading is effected through means other than hatches, all loading and vapor lines shall be equipped with fittings which make vapor-tight connections and which close automatically when disconnected.

E. Pumps and Compressors

1. All pumps and compressors handling volatile organic compounds shall have mechanical seals.

F. Water Separators

1. It shall be prohibited to cause or allow the use of any compartment of any single or multiple compartment volatile organic compound water separator which compartment received effluent water containing 200 gallons a day or more of any volatile organic compound from any equipment processing, refining, treating, storing, or handling volatile organic compounds consisting of kerosene or more volatile organic materials, unless such compartment is equipped with one of the following vapor loss control devices:

VII. Standards for Organic Compounds (Contd.)

a) A container having all openings sealed and totally enclosing the liquid contents. All gauging and sampling devices shall be gas-tight except when gauging or sampling is taking place.

b) A container equipped with a floating roof, consisting of a pontoon type roof, double deck type roof or internal floating cover, which will rest on the surface of the contents and be equipped with a closure seal or seals to close the space between the roof edge and container wall. All gauging and sampling devices shall be gas-tight except when gauging or sampling is taking place.

PENNSYLVANIA SOLID WASTE REGULATIONS

Basis: Title 25, Rules and Regulations, Part I, Article 1, Land Resources, Chapter 75, Solid Waste Management.

Agency: The Department of Environmental Resources

I. Scope

The provisions of this chapter apply to any person, municipality, county or authority storing, collecting, transporting, processing or disposing of solid waste.

II. Processing and Disposal Area Permits

A. General Permit Requirement

A permit shall be required of any person, municipality, county or authority proposing to use or continue to use their land or any other land as a solid waste processing or disposal area.

B. Design of Waste Processing or Disposal Facility

All solid waste processing or disposal facilities and operations shall be designed by a registered professional engineer in accordance with the requirements of the Department of Environmental Resources. The design shall bear the signature and seal of the registered professional engineer.

III. General Standards

A. Operating Standards

All areas of solid waste management systems, including all processing and disposal facilities, shall be operated in such a manner as to prevent health hazards and environmental pollution.

B. Access Roads

All weather access roads negotiable by loaded collection vehicles shall be provided to the entrance of the site or facility.

1. Minimum width for two way traffic shall be 22 feet.
2. For one way traffic, separate roads with a minimum width of 12 feet.

III. General Standards (Contd.)

C. Communications

Telephone or radio communications shall be available at or readily accessible to the site.

D. Fire Protection

1. Adequate equipment shall be available for minimizing fire hazard.

2. Fire extinguishers shall be provided for all equipment and buildings.

IV. Standards for Sanitary Landfill

A. Geologic Characteristics

1. Criteria for Reports

   a. A soils, geologic and ground water report of the characteristics of the proposed site shall be included as required by the Department.

   b. A sufficient number of borings or wells shall be drilled to determine the soil, geology and ground water conditions.

   c. Borings or wells shall be drilled five feet into the ground water or bedrock or 20 feet below the base of the proposed landfill, whichever is shallower.

   d. One boring or well shall be drilled near the point of highest elevation, ten feet into the ground water.

2. Cover Material Characteristics

   Cover material shall be suitable soil or other material which shall have medium to moderately coarse texture and be of such character that it is easily compacted.

   a. Some specific types of soil and other materials are unsuitable and shall only be used as approved by the Department. Included in the unsuitable categories shall be loamy sand, silt, clay loam, sandy clay, clay, silty sand, organic soils, incinerator residue and fly ash

IV. Standards for Sanitary Landfill (Contd.)

3. Prevention of Ground Water Pollution

   a. Sites with less than six feet of fine soil over lime stone or other fissured rocks; or coarse sand and gravel shall be considered unsuitable.

   b. A site with six or more feet of fine soil over lime stone or other fissured rocks, or coarse sand and gravel is in the range of limited suitability.

   c. Depth to the seasonal high water table shall be greater than six feet from the bottom of the lowest refuse lift. The depth shall be increased by at least six feet for each additional lift.

   d. The site shall not have a flooding hazard of greater frequency than once in 50 years.

   e. The site shall be designed in a manner which will manage surface water percolation.

   f. Direct fill into water or flood plain shall not be permitted.

   g. Sites not meeting the above specification for the prevention of ground water pollution may be utilized if leachate collection and treatment facilities are approved by the Department.

4. Drainage of Surface Water

   a. Provisions shall be made to manage surface water at the sanitary landfill site.

   b. The grading of the final surface of the fill area shall provide a slope of not less than 1.0% but not exceeding 15%, except as approved by the Department.

B. Operating Standards

Only those standards which provide some design criteria are provided within this synopsis.

IV. Standards for Sanitary Landfill (Contd.)

1. Measuring facilities

   a. All solid waste shall be weighed on permanently installed or portable truck scales.

2. Control of Blowing Litter

   a. Portable fencing constructed of wire mesh, snow-fencing or other suitable material shall be used to control blowing litter.

   b. Litter control fences shall be located in the immediate operating area, approximately 50 to 75 feet downwind from the working face.

3. Burning

   a. Open burning of solid waste shall not be allowed at the sanitary landfill.

4. Dust Control

   a. To control dust problems, one or more of the following measures shall be implemented:

      1) Paving of access roads and roads leading to the unloading area;

      2) Application of moisture absorbing chemicals such as calcium chloride to roadways;

      3) Application of oil to roadways; or

      4) Spraying water, as needed, on roadways.

C. Disposal of Waste

The standards under the disposal of waste section contain primarily operational requirements and are not included herein.

1. Sewage Solids, Liquids and Hazardous Waste:

   a. The disposal of sewage solids, liquids and hazardous waste in a sanitary landfill shall not be permitted until the methods of disposal, suitablity of the site and plan of operation have been reviewed and approved by the Department.

IV. Standards for Sanitary Landfill (Contd.)

b. All wastes of a hazardous nature, radioactive material, waste chemicals and explosives shall not be disposed of in the sanitary landfill unless they comply with the requirements of the Department.

V. Standards for Solid Waste Incinerator Facilities

A. Design of Facilities

1. Minimum Design Criteria

a. A survey of meteorological and topographical conditions prevalent in the area shall be made to assure proper location of stack.

2. Facilities and Utilities Required

a. Incinerator and related structures shall contain all facilities as required to comply with State and local codes.

3. Illumination Standards

a. Illumination shall conform to Illuminating Engineering Society Standards.

4. Major Instrumentation Location and Equipment

a. Major instrumentation, where practical, shall be confined to one area.

5. Refuse Storage Facilities

Refuse storage facilities shall be provided to conform with the operation of the incinerator, and eliminate nuisances.

VI. Hazardous Solid Waste

A. Processing and Disposal of Waste

1. Only authorized sites and methods may be used for processing and disposal of hazardous waste.

2. No additional hazards or environmental pollution shall be created in processing hazardous waste.

VI. Hazardous Solid Waste (Contd.)

3. A handling method shall be established for each disposal site accepting hazardous waste.

VII. Coal Refuse Disposal Areas (Title 25, Part 1, Article III, Chapters 100 and 125)

A. Permit Requirements

1. No person shall establish or operate a coal refuse disposal area without first having obtained a permit from the Department.

B. Prevention and Control of Water Pollution

1. Maximum height of new coal refuse disposal piles shall be limited to 100 feet above the average elevation of the area.

2. Coal refuse may not be deposited in layers exceeding two feet in depth.

3. A minimum clear space of 50 feet shall be provided from the outer perimeter of any coal refuse disposal pile unless otherwise approved by the Department.

4. Provisions shall be made to manage surface water at the coal refuse disposal area. This shall include necessary diversion structures to prevent surface run off from flowing over or percolating through coal refuse.

C. Definitions

1. "Coal refuse disposal area" - means any general area or plot of land used as a place for dumping, storage or disposal of coal refuse.

2. "Coal refuse" means any waste coal, rock, slurry, slate, clay and related materials, associated with or near a coal seam, which are either brought above ground or otherwise removed from a coal mine in the process of mining coal, or which are separated from coal during the cleaning or preparation operations.

TENNESSEE WATER QUALITY CRITERIA

Basis: General Water Quality Criteria for the Definition and Control of Pollution in the Waters of Tennessee (Chapter 1200-4-3)

Agency: Tennessee Water Quality Control Board

Note: (1) Anyone who desires to discharge into the waters of the State of Tennessee must apply for and receive a wastewater Discharge Permit from the Division of Water Quality Control.

I. GENERAL WATER QUALITY CRITERIA (Receiving Water Quality)

A. Domestic Raw Water Supply

Condition and Substance	Limitations
1. Dissolved Oxygen	There shall be sufficient dissolved oxygen to prevent decomposition odors and other offensive conditions.
2. pH (range)	6.0 - 9.0 not to fluctuate more than 1.0 unit in this range over a period of 24 hours.
3. Hardness (or mineral deposits)	No substance shall be added that will appreciable impair the use of the water for its intended purpose.
4. Total Dissolved Solids	500 mg/l
5. Solids, Floating Material	No distinctly visible solids, scum, foam, oil slick or formation of slimes, bottom deposits or sludge banks which may impair the use of the water for its intended purpose.
6. Turbidity or Color	No turbidity or color shall be added which cannot be reduced to acceptable concentrations by conventional water treatment.

TENNESSEE WATER QUALITY CRITERIA

I. GENERAL WATER QUALITY CRITERIA (Receiving Water Quality) (CONTD.)

Conditions or Substance	Limitations
7. Temperature	Maximum water temperature change relative to an upstream control point 3°C. The maximum water temperature shall be 30.5°C, the maximum rate of change shall not exceed 2° per hour.
8. Fecal Coliform Group	≤1000/100 ml, geometric mean based on a minimum of 10 amples sat a given sample site over a period of 30 days. ≤5000/100 ml for any individual sample.
9. Taste or Odor	No substance shall be added which results in taste or odor that would prevent the production of potable water by conventional water treatment.
10. Toxic Substances	There shall be no toxic substances added that will produce toxic conditions that will materially affect man or animals or impair the safety of a conventionally treated water supply.
11. Other Pollutants	Other pollutants shall not be added in quantities that may be detrimental to public health or impair the waters as a source of domestic water supply.

TENNESSEE WATER QUALITY CRITERIA

I. GENERAL WATER QUALITY CRITERIA (CONTD.) (Receiving Water Quality)

B. Industrial Water Supply

Conditions or Substance	Limitations
1. Dissolved Oxygen	There shall be sufficient dissolved oxygen to prevent decomposition odors and other offensive conditions.
2. pH (range)	6.0 -9.0 not to fluctuate more than 1.0 unit in this range over a period of 24 hours.
3. Hardness (or mineral deposits)	No substance should be added that will appreciably impair the use of the water for its intended purpose.
4. Total Dissolved Solids	$\leq$500 mg/l
5. Solids, Floating Material and Deposits	No distinctly visible solids, scum, foam, oil slick or formation of slime, bottom deposits or sludge banks which may impair the use of the water for its intended purpose.
6. Turbidity or Color	No turbidity or color which cannot be reduced to acceptable concentrations by conventional water treatment.
7. Temperature	Maximum water temperature change relative to an upstream control shall not exceed 3°C. The maximum water temperature shall not exceed 30.5°C, the maximum rate of change shall not exceed 2°C per hour.

TENNESSEE WATER QUALITY CRITERIA

I. GENERAL WATER QUALITY CRITERIA (Receiving Water Quality)
(CONTD.)

Conditions or Substance	Limitations
8. Toxic Substances	There shall be no toxic substances added that will produce toxic conditions which will adversely affect the water for industrial processing.
9. Taste or Odor	No substance shall be added which results in taste or odor that would prevent the use of the water for industrial processing.
10. Other Pollutants	Other pollutants shall not be added in quanities that may adversely affect the water for industrial processing.

C. Fish and Aquatic Life

Note: As many of the criteria for the fish and aquatic life water use catagory are the same as the above listed criteria for the domestic water, raw water supply and industrial water supply catagory, ONLY those areas which establish different criteria are shown; and the other requirements should be considered to be the same as listed above.

Condition or Substance	Limitations
1. Dissolved Oxygen	≤5.0 mg/l Exceptions: (1) Where present technology cannot restore the water quality to the desired minimum of 5.0 mg/l

TENNESSEE WATER QUALITY CRITERIA

I. GENERAL WATER QUALITY CRITERIA (Receiving Water Quality) (CONTD.)

Conditions or Substance	Limitations
1. Dissolved Oxygen (Contd.)	(2) The cost of meeting the standard is economically prohibitive when compared to benefits obtained, or (3) The natural qualities of the water are less than the desired minimum of 5.0 mg/1. The Exceptions shall be determined on an individual basis but in no instance shall the dissolved oxygen be less than 3.0 mg/1.
2. pH	6.0-8.5 not to fluctuate more than 1.0 unit in this range over a period of 24 hours.
3. Solids, Floating Material and Deposits	See I., A and B, 5 above.
4. Turbidity or Color	See I., A and B, 6 above.
5. Temperature	See I., A and B, 7 above - except for recognized trout waters where the temperature shall not exceed 20°C.
6. Taste or Odor	See I., A and B, 9 above.
7. Toxic Substances	See I. A, 10 and I., B, 8 above.
8. Other Pollutants	See I., A, 11 and I., B, 10 above.
9. Fecal Coliform Group	See I., A, 8 above.

TENNESSEE WATER QUALITY CRITERIA

I. GENERAL WATER QUALITY CRITERIA (Receiving Water Quality) (CONTD.)

D. Recreation

Conditions or Substance	Limitations
1. Dissolved Oxygen	See I., A and B, 1 above.
2. pH	See I, A and B, 2 above.
3. Solids, Floating Material and Deposits	See I, A and B, 5 above.
4. Turbidity and Color	No turbidity or color added in such amounts or character that will result in any objectionable appearance to the water.
5. Temperature	See I., A and B, 7 above.
6. Fecal Coliform Group	≤200/100 ml, as a geometric mean based on a minimum of 10 samples from a given sample location over a period of not more than 30 days. ≤1000/100 ml in any individual sample.
7. Taste or Odor	See I., A and B, 9 above.
8. Toxic Substance	See I., A, 10 above.
9. Other Pollutants	Other pollutants shall not be added in quantities which will have a detrimental effect on reaction.

TENNESSEE WATER QUALITY CRITERIA

I. GENERAL WATER QUALITY CRITERIA (Receiving Water Quality) (CONTD.)

E. Irrigation, Livestock Watering and Wildlife, and Navigation Category

Compliance with Sections I., A and I., B above will satisfy the requirements of these specific receiving water criteria.

F. Non-Degradation

The above conditions are recognized as applying to waters affected by the discharge of sewage and/or industrial waste or other waste and not resulting from natural causes.

These criteria should not be construed as permitting the degradation of higher quality water when such can be prevented by reasonable pollution control measures.

II. TREATMENT REQUIRED

All discharges or sewage, industrial waste, or other waste shall receive the best practicable treatment (secondary or the equivalent) or control according to the policy and procedure of the Tennessee Water Quality Control Board.

TENNESSEE: STANDARDS OF PERFORMANCE FOR STATIONARY SOURCES

Agency: Air Pollution Control Board

I. General Provisions

A. Definitions

1. "Fuel Burning Equipment" is any equipment, device or contrivance and all appurtenances thereto, in which fuel is burned for the primary purpose of producing thermal energy and in which the material being heated is not contacted by, and adds no substance to, the products of combustion.

2. "Fugitive Dust" is any visible emission, other than water droplets, issuing from any source other than through a stack.

3. "Opacity" is that property of a substance tending to obscure vision and is measured in terms of percent obscuration. As used in these regulations it does not include obscuration of vision due to uncombined water droplets. The percentage opacity of a plume is numerically equal to twenty (20) times the Ringlemann number for a plume of black smoke having equivalent capacity of obscuration.

4. "Particulate Matter" is any material, except uncombined water, that exists in a finely divided form as a liquid or a solid.

5. "Parts Per Million" (ppm) is a term describing parts of an air contaminant per million parts of gas by volume (1 ppm equals 0.0001 percent by volume).

6. "Process Emission" is any emission of an air contaminant to the ambient air other than that from fuel burning equipment, incinerators, or open burning.

7. "Process Emission Source" is one or more units of processing equipment which may be operated independently of other parts of the operations at any given manufacturing or processing facility; also, where it is common practice to group more than one unit of like or similar processing equipment together and to apply a single or combined unit of air pollution control equipment to the emissions of the entire group, such group of units shall be construed as a process emission source.

TENNESSEE: STANDARDS OF PERFORMANCE FOR STATIONARY SOURCES

Agency: Air Pollution Control Board

I. General Provisions (Contd.)

8. "Process Weight" means the total weight of all materials introduced into any specific process that may cause any emission of particulate matter. Solid fuels charged are considered as part of the process weight, but liquid and gaseous fuels and combustion air are not.

9. "Ringlemann Chart" is the chart published and described in the U. S. Bureau of Mines Information Circular 8333.

II. Non-Process Emission Standards

A. Fuel Burning Equipment-Particulate Emissions

Heat Input to Source	Maximum Allowable Particulate Emission
≤ 10 MM Btu/hr	0.6 lbs/MM Btu
≥ 250 MM Btu/hr	0.1 lbs/MM Btu
≥ 10 <250 MM Btu/hr	use: $E = 0.6 \left(\frac{10}{Q}\right)^{0.5566}$

where: E = maximum allowable emission in lbs/MM Btu; and
Q = Heat input in MM Btu/hr

(Total rate of heat input to all stacks in the plant shall be used for heat input above.)

B. General Non-Process Gaseous Emission Standards

1. Definitions. "Air contaminant source" means any and all sources of emission of air contaminants, whether privately or publicly owned. Without limiting the generality of the foregoing, this term includes all types of business, commercial and industrial plants, works, shops, and stores, and heating and power plants and stations, buildings and other structures of all types, incinerators of all types (indoor and outdoor) refuse dumps and piles, and all stack and other chimney outlets from any of the foregoing.

2. Standard. Air contaminant sources shall have installed and utilize the best currently available equipment and control technology for limiting emissions of gaseous air contaminants.

II. Non-Process Emission Standards (Contd.)

C. Non-Process Nitrogen Emission Standards

1. Affected facilities: Sources of 250 MM Btu/hr total heat input or greater.

2. Standards

Maximum emission rates (calculated as NO_2)

gaseous fossil fuel: 165 ppm corrected to 15% excess air (equivalent to 0.20 lbs/MM Btu heat input, max. 2 hour average)

liquid fossil fuel: 227 ppm corrected to 15% excess air (equivalent to 0.30 lbs/MM Btu heat input, max. 2 hour average)

solid fossil fuel: 525 ppm corrected to 15% excess air (equivalent to 0.70 lbs/MM Btu heat input, max. 2 hour average.

Mixtures of fossil fuels:

$$\text{use:}\quad E = \frac{X(0.20)\ Y(0.30)\ Z\ (0.70)}{X + Y + Z}$$

where: E = allowable max. emission in lbs/MM Btu heat input
X = % of total heat input from gaseous fossil fuel;
Y = % of total heat input from liquid fossil fuel; and
Z = % of total heat input from solid fossil fuel.

III. Process Emission Standards

A. Particulate Emissions - General Process Standards

1. Particulate non-attainment counties. In any county where one or more sources are emitting particulates at rates in conformity with applicable maximum emission rates and the ambient air quality standard for particulate matter is being exceeded, the Board shall set an appropriate emission standard for each source contributing to the particulate matter in the ambient air of the county, at such value as the Board may deem necessary to achieve the desired air quality.

III. Process Emission Standards (Contd.)

2. Maximum Particulate Emissions

process weight rate <30 T/hr:
use: $E = 3.59P^{0.62}$

where: E = Maximum emissions in lbs/hr (particulate); and
P = Process weight rate in T/hr

process weight rate >30T/hr:
use: $E = 17.31P^{0.16}$

where: (E and P are as defined as above)

3. Additional Particulate Limitations - Concentration

a) Irrespective of the maximum emissions determined by application of subsection 2. standards above:
   (i) the concentration of particulate emissions shall not be required to be less than 0.02 gr/ft^3 of stack gases (at 70°F and 1 atmos.) unless the Board deems a lesser concentration necessary as per subsection 1.; and
   (ii) the maximum concentration of particulate emissions shall be 0.25 gr/ft^3 of stack gases (at 70°F and 1 atmos.)

B. Gaseous Air Contaminants - General Process Standards

1. Sources of gaseous air contaminants shall utilize equipment and technology deemed reasonable and proper by the Board to control such gaseous emissions.

C. Applicability of Standards. The emission limitations set forth in subsection A. above will control, where applicable, unless a specific standard for a designated process emission source is contained or incorporated in a subsequent subsection of this section III.

D. Specific Process Emission Standards

1. Tennessee Designated - Specific Process Emissions

[Tennessee has designated six sources (new, existing, or both) under this topic and promulgated specific emission standards for each of these six process sources. None of these are relevant to this project and so are not included herein.]

III. Process Emission Standards (Contd.)

2. United States EPA - "Standards for New Stationary Sources".

   a) The [Tennessee] Board shall from time to time, after public hearing, adopt additional standards of performance for new stationary sources as promulgated by the United States EPA. [The first twelve sources of the Federal stationary emission sources (40 CFR 60, Subparts D through O) have been designated and adopted by Tennessee and the standards for these are included (with minor administration related changes) in the Tennessee air regulations. The portions of these federal regulations relevant to this project have been synopsized and this synopsis may be found under the "Federal EPA Regulations and Standards" section of this report. The relevant sources included are listed in 2.b) below.]

   b) The Federal regulations incorporated and synopsized herein because relevant or partially relevant to fossil-fuel conversion facilities within the scope of this project cover the following listed plants or facilities:

      i) Fossil-fuel fired steam generators (40 CFR, Part 60, Subpart D).
      ii) Incinerators (40 CFR, Part 60, Subpart E).
      iii) Storage Vessels for Petroleum Liquids (40 CFR, Part 60, Subpart K).
      iv) Petroleum Refineries (40 CFR, Part 60, Subpart J).

IV. Visible Emissions Standards

A. Maximum allowable discharge of visible emissions

Density not to exceed No. 1 on Ringelmann Chart (equals an opacity of 20%) for aggregate periods of not more than 5 minutes in any 1 hour or not more than 20 minutes in any 24 hour period.

B. Exceptions (to subsection A.)

An affected facility shall have due allowance from the provisions of subsection A. when excessive emissions occur as the result of start-up, breakdown or upset conditions provided reporting or permit requirements for such occurrences are adhered to.

C. Visible Emissions - Fugitive Dust

Discharge of visible emissions beyond the property boundaries shall not be allowed except for periods less

IV. Visible Emissions Standards (Contd.)

than 5 minutes per hour or 20 minutes per day (24 hours) or during periods of startup, breakdown or upset conditions for which reporting requirements are met.

V. Emission Standards for Fugitive Dust

A. Materials shall not be handled, stored, or transported and buildings with appurtenances, and roads shall not be used, constructed, altered, repaired, or demolished without reasonable precautions having been taken to prevent particulate matter from becoming airborne. Such reasonable precautions shall include, but are not limited to, the following:

1. Use, where possible, of water or chemicals for control of dust in demolition of existing buildings or structures, construction operations, grading of roads or the cleaning of land;

2. Application of asphalt, oil, water, or suitable chemicals on dirt roads, materials stock piles, and other surfaces which can create airborne dusts; and

3. Installation and use of hoods, fans and fabric filters to enclose and vent the handling of dusty materials. Adequate containment methods shall be employed during sandblasting and other similar operations.

VI. Emission Standards for Hazardous Contaminants

A. Applicability

[Tennessee has designated asbestos, beryllium, and mercury as hazardous air contaminants. This is in keeping with its stated policy to designate hazardous air contaminants corresponding to those contaminants for which regulations have been promulgated by the United States Environmental Protection Agency. A synopsis of the Federal regulations for mercury and beryllium, the only of these substances relevant to this project, may be found in "Federal EPA regulations and Standards" portion of this report. The Tennessee standards for mercury and beryllium are neither broader nor more stringent than the Federal standards relevant to this project so are not included here. The Tennessee definition of "hazardous air contaminants", however, is given in B. below.]

B. Definitions

1. Hazardous air contaminants" are any air contaminants which may cause, or contribute to, an increase in

VI. Emission Standards for Hazardous Air Contaminants (Contd.)

mortality or an increase in serious irreversible, or incapacitating reversible illness, and has been so designated by the Air Pollution Control Board. Asbestos, beryllium and mercury are designated hazardous air contaminants.

VII. Emission Standards for Sulfur Dioxide (SO_2)

A. General Provisions

1. Definitions

a) For the purpose of section VII., each county in Tennessee will be classified into one of six categories, Class I through Class VI. Each class has been established with the essential limit necessary to attain and/or maintain ambient air quality standards based on measured and predicted air quality. The county classifications are as follows:

Class I - Polk
Class II - Humphreys, Maury, Roane
Class III - Sullivan
Class IV - Shelby
Class V - Anderson, D. Davidson, Hamilton, Hawkins, Knox, Rhea
Class VI - all other counties

B. Non-process Emission Standards

1. Fuel Burning Equipment

a) Maximum Emission of SO_2
≤250 MM Btu/hr heat input (rated capacity):

Class I County - 1.6 lb/MM Btu heat input (1 hr average)
Class II or VI Counties - 5.0 lb/MM Btu heat input (1 hr average)

All Counties - >250 MM Btu/hr heat input (rated capacity):

Liquid fossil fuel - .80 lb/MM Btu heat input (1 hr average)
Solid fossil fuel - 1.2 lb/MM Btu heat input (1 hr average)

VII. Emission Standards for Sulfur Dioxide (SO_2) (Contd.)

for different fossil fuels burned simultaneously in any combination-

use $$E = \frac{Y(0.80) + Z(1.2)}{Y + Z}$$

where: E is the maximum allowable emission in lb of SO_2/MM Btu heat input;
Y is the % of total heat derived from liquid fossil fuel; and
Z is the % of total heat derived from solid fossil fuel.

C. Process Emission Standards

1. Affected facilities: the sources or facilities encompassed by the definition of "process emission sources" in Section I. and, incinerators shall be construed as process emission sources for purposes of this subsection.

2. Regardless of the specific emission standard in this subsection C., emission sources shall utilize the best available control technology as deemed appropriate by the Board.

3. Maximum Emissions
(SO_x express as SO_2)

Class I Counties: 500 ppm, dry basis, 1 hr average

Class IV, V and VI Counties: 2000 ppm, dry basis, 1 hr average

TENNESSEE SOLID WASTE REGULATIONS

Basis: 1. Regulations Governing Solid Waste Processing Disposal in Tennessee, 1975.

2. Tennessee Hazardous Waste Disposal Act.

Agency: State Department of Public Health, Solid Waste Disposal Control Board.

Note: 1. Section 53-4310 of the Tennessee Solid Waste Disposal Act states that "This Act shall not prohibit any person from disposing of his own solid waste upon his own lands provided such disposal does not create a public nuisance or a hazard to the public health."

I. Solid Waste Disposal System Design and Construction

A. General

No new construction shall be initiated for any solid waste disposal facility or site until the plans for such new construction have been submitted to and approved by the Department.

B. Disposal Facility or Site

1. General

For land disposal sites serving industrial concerns the method of disposal, including design, construction and operation, shall be approved by the Department for each individual situation.

2. Sanitary Landfill

Plans and specifications should be prepared by an engineer licensed to practice in Tennessee.

3. Basic Design Considerations:

a. No site shall be subject to flooding. Geologic conditions shall be such as not to permit pollution of ground water. The site must comply with the local zoning requirements and land use planning.

b. All-weather roads shall be provided to and on the disposal site.

I. Solid Waste Disposal System Design and Construction (Contd.)

c. All surface water shall be diverted around the operations area. Water shall not be allowed to accumulate at any location on the site unless such location has been approved by the Department.

d. Access to the site shall be controlled by means of gates and by fencing if such becomes necessary.

e. A heated structure shall be provided on the site for use of operating personnel.

f. Fire protection shall be provided. The specific method shall be approved by the Department.

II. Solid Waste Disposal System Operation

The standards under this part are operational and provide no direct applicable design requirements. Therefore, they are not included within the synopsis of the solid waste disposal criteria.

III. Tennessee Hazardous Waste Disposal Act

A. Definitions

1. "Hazardous waste." Any waste or combination of wastes which is determined to present a potential or immediate danger to human health or safety to any part of the environment because of its quantity, concentration, chemical or pathological characteristics.
2. "Industrial waste." Waste resultant either directly or indirectly from manufacturing operation.

B. Limitations on Hazardous Waste

It shall be unlawful to:

1. Deposit hazardous waste into the waters of the State except as approved by the State Water Quality Control Board;

III. Tennessee Hazardous Waste Disposal Act (Contd.)

2. "Industrial waste." Waste resultant either directly or indirectly from a manufacturing operation.

B. Limitations on Hazardous Waste

It shall be unlawful to:

1. Deposit hazardous waste into the waters of the State except as approved by the State Water Quality Control Board;
2. Burn hazardous waste except under approved conditions; and
3. Construct or operate a hazardous waste processing or disposal facility or site in violation of the rules, regulations, or orders of the Department of Public Health or in such a manner as to create a nuisance.

TEXAS WATER QUALITY STANDARDS

Basis: Texas Water Quality Standards, February 1976

Agency: Texas Water Quality Board

Note: (1) Any person who discharges wastes into or adjacent to the waters in the State of Texas must apply for and receive a waste control order from the Texas Water Quality Board for such discharge.

(2) The Texas Water Quality Standards have listed 25 separate basins and estuaries with specific water quality standards for approximately 300 identified water segments within the state.

I. GENERAL WATER QUALITY CRITERIA

A. Criteria applicable to all surface waters of the state and specifically applicable with respect to substances attributed to waste discharge.

Condition or Substance	Limitations
1. Taste or Odor	Concentration of substances shall be limited such that they will not interfere with production of potable water by reasonable treatment methods, or otherwide interfere with the reasonable use of the waters.
2. Floating Debris and Settleable Suspended Solids	Waters shall be essentially free of these substances which would adversely affect the intended use of the waters.
3. Turbidity	No substantial change from ambient conditions due to waste discharges.
4. Foaming or Frothing	None of a persistent nature.
5. Radioactive Materials	In fresh water associated with the dissolved minerals, shall not exceed those set forth in the U.S. Public Health Service, Drinking Water Standards 1962, or latest revisions.

TEXAS WATER QUALITY STANDARDS

I. GENERAL WATER QUALITY CRITERIA (CONTD.)

6. Toxic Substances	None that will be toxic to man, fish and wildlife. For a general guide, with respect to fish toxicity, receiving waters outside mixing zones should not have a concentration of non-persistent toxic materials exceeding 1/10 of the 96-hour TLM. For persistent toxicants, the concentration should not exceed 1/20 of the 96-hour TLM.
7. Oil, Grease or Related Residue	None which will produce a visible film of oil or globules of grease on the surface, or coat the banks and bottoms of the water course.

II. CLASSIFICATION OF SURFACE WATERS

The surface waters of the State are divided into the following categories.

A. River Basin Waters

Inland surface waters comprising the major rivers and their tributaries including listed impounded waters and including the tidal portion of the river to the extent that it is confined in a channel.

B. Coastal Basin Waters

Those inland surface waters, including listed impounded waters discharging or flowing or otherwise communicating with bays or the gulf including the tidal portion of the streams to the extent they are confined in channels.

TEXAS WATER QUALITY STANDARDS

II. CLASSIFICATION OF SURFACE WATERS (CONTD.)

C. Bay Waters

All tidal waters exclusive of those included in river basin waters, coastal basin waters, and gulf waters.

D. Gulf Waters

Those waters which are a part of the open waters of the Gulf of Mexico to the limit of Texas' jurisdiction and which are not included in or form a part of any bay or estuary.

III. WATER USES DEEMED DESIRABLE FOR SPECIFIC SURFACE WASTES DESIGNATED IN THE STANDARDS

A. Contact Recreation Waters

1. Fecal Coliform Group	≤200/100 ml, geometric mean from a representative sampling of not less than 5 samples collected over not more than 30 days, nor shall more than 10% of total samples during any 30-day period exceed 400/100 ml.

B. Non-contract Recreation Waters

1. Fecal Coliform Group	≤2000/100 ml, nor equal or exceed 4,000/100 ml in more than 10% of the samples, except in specified mixing zones.

C. Domestic Raw Water Supply

1. Coliform	It is desirable that the total coliform content

III. WATER USES DEEMED DESIRABLE FOR SPECIFIC SURFACE WASTES DESIGNATED IN THE STANDARDS (CONTD.)

1. Coliform (Contd.)	should not exceed 100/100 ml and the fecal coliform content 20/100 ml, however, domestic water supplies should not be considered unacceptable if an adequate number of samples show monthly arithmetic averages for total coliform of less than 10,000 ml/100 ml and fecal coliform of less than 2,000/100 ml.
2. National Primary Drinking	Domestic raw water supply quality should be consistant with the findings of EPA regarding maximum techniques.

D. Progagation of Fish and Wildlife

IV. NUMERICAL CRITERIA

A. The numerical criteria apply to specific waters identified in the water quality standards.

B. The specific numerical values represent arithmetic average conditions over a one year period.

C. The temperature limitations are applicable to the waters specifically identified. Temperature standards are composed of two parts, a maximum temperature and a maximum temperature differential attributable to heated effluents, and are as follows:

1. Fresh Water Streams:

a. Maximum Temperature	Determined by reference to specific waters
b. Maximum Temperature Differential	5°F rise over ambient.

TEXAS WATER QUALITY STANDARDS

IV. NUMERICAL CRITERIA (CONTD.)

2. Fresh Water Impoundments:

a. Maximum Temperature	Determined by reference to specific waters.
b. Maximum Temperature	3°F rise over ambient.

3. Tidal River Reaches, Bay and Gulf Waters

	Fall, Winter, Spring	Summer
a. Maximum Temperature Differential	4°F	1.5°F
b. Maximum Temperature	95°F	95°F

The temperature requirements shall not apply to off-stream or privately owned reservoirs, constructed principally for industrial cooling purposes and financed in whole or in part by the entity or successor entity using, or proposing to use, the lake for cooling purposes.

V. EXCEPTIONS

A. The water quality standards will not apply to treated effluents.

B. The water quality standards, except general criteria will not apply to:

1. Water in mixing zones or in a valid control order from the Texas Water Quality Board or a National Pollutant Discharge Elimination System permit, or
2. Inland effluent dominated streams during periods when the daily flow is totally composed effluent excluding minor amounts of bank seepage; or
3. Dead-end barge and dead-end ship channels constructed for navigation purposes unless specifically designated in the tables setting forth specific standards.

V. EXCEPTIONS (CONTD.)

Where the exceptions as shown in 2 and 3 above are applicable, such waste treatment as is necessary to maintain a minimum of 2.0 mg/l of dissolved oxygen in the receiving stream will be required. Waste treatment over and above that required to meet a 2 mg/l dissolved oxygen standard may be required.

TEXAS: STANDARDS OF PERFORMANCE FOR STATIONARY SOURCES

(Agency: Texas Air Control Board)

I. GENERAL PROVISIONS

A. Definitions

1. Executive Director. The Executive Director of the Texas Air Control Board.

2. Combustion Unit. Any boiler plant, furnace, incinerator, flare, engine, or other device or system used to oxidize solid, liquid, or gaseous fuels, but excluding motors and engines used in propelling land, water, and air vehicles.

3. Net Ground-Level Concentration. The upwind level subtracted from the downwind level.

4. Non-Methane Hydrocarbons. The total hydrocarbon content of the sample minus the methane content of the sample.

5. Opacity. The degree to which an emission of air contaminants obstructs the transmission of light, expressed as the percentage to which the light is obstructed as measured by an optical instrument or trained observer.

6. Particulate Matter. Any material, except uncombined water, that exists as a solid or liquid in the atmosphere or in a gas stream at standard conditions.

7. Process or Processes. Any action, operation, or treatment embracing chemical, commercial, industrial, or manufacturing factors such as combustion units, kilns, stills, dryers, roasters, and equipment used in connection therewith, and all other methods or forms of manufacturing or processing that may emit smoke, particulate matter, gaseous matter, or visible emissions.

8. Property. All land under common control or ownership on which any source or combination of sources is located, coupled with all improvements on such land, and all fixed or movable objects on such land, or any vessel on the waters of this State which may constitute a source.

I. GENERAL PROVISIONS (CONTD.)

9. Source. A point of origin of air contaminants, whether privately or publicly owned or operated. Upon request of a source owner the Executive Director shall determine whether multiple processes emitting air contaminants from a single point of emission will be treated as a single source or as multiple sources.

10. Visible Emissions. Particulate or gaseous matter which can be detected by the human eye. The radiant energy from an open flame shall not be considered a visible emission under this definition.

B. Nuisance.

It shall be prohibited to discharge from any source whatsoever one or more air contaminants or combinations thereof, in such concentration and of such duration as are or may tend to be injurious to or to adversely affect human health or welfare, animal life, vegetation or property, or as to interfere with the normal use and enjoyment of animal life, vegetation or property.

II. VISIBLE EMISSION STANDARDS

A. Maximum Emissions from Stationary Flues

1. General: 20% opacity, 5 min. average.
   Exception: This limit may be exceeded during the cleaning of a firebox, building of a new fire, sootblowing, equipment changes, ash removal, and rapping of precipitators for not more than 5 min. in any 1 hr period nor more than 6 hours in any 10 day period.

2. Flues with 100,000 acfm or more flow rate:
   15% opacity, 5 min. average, unless an optical instrument capable of measuring the opacity of emissions is installed in the flue and proper measurement records as prescribed in rules related thereto are kept.

B. Waste Gas Flares

1. No visible emissions shall be permitted for more than 5 min. in any 2 hr period except as provided for in

II. VISIBLE EMISSION STANDARDS (CONTD.)

provisions of the Texas air regulations exempting major unavoidable upsets if certain procedures are followed.

C. Buildings and Enclosed Facilities

1. Excessive visible emissions shall not be permitted.

D. Exceptions

1. Contributions from uncombined water shall not be included in determining compliance with requirements of this section II. The burden of proof to establish the applicability of this exception shall be upon the party seeking to have it applied.

III. STANDARDS FOR FUGITIVE PARTICULATE MATTER

A. Affected facilities:

1. Sources in Standard Metropolitan Statistical Areas where Federal air quality standards for particulate matter are exceeded.

B. Definitions

1. "Standard Metropolitan Statistical Area" means an area consisting of a county or two or more contiguous counties and which area is officially so designated by the U.S. Bureau of the Budget.

C. Prevention of Airborne Particulate Matter - Material Handling, Construction, and Roads

1. It shall be prohibited to cause or permit any fine material to be handled, transported, or stored without taking at least the following precautions to prevent particulate matter from becoming airborne:
    a) Application of water or suitable chemicals or some other covering on materials stockpiles and any surfaces which can create airborne dusts under normal conditions;
    b) Installation and use of hoods, fans, and filters to enclose, collect, and clean the emissions of dusty materials;
    c) Covering or wetting at all times when in motion of open-bodied trucks, trailers, or railroad cars transporting materials which can become airborne particulate matter in areas to which the public has access.

TEXAS: STANDARDS OF PERFORMANCE FOR STATIONARY SOURCES

III. STANDARDS FOR FUGITIVE PARTICULATE MATTER (CONTD.)

2. It shall be prohibited to cause or permit a building structure to be used, constructed, altered, repaired or demolished without taking at least the following precautions:
   a) Use of water or chemicals where feasible for control of dust in the demolition of buildings or structures, in construction operations, or in the clearing of land;
   b) Use of adequate methods to prevent airborne particulate matter during sandblasting of buildings or other similar operations.

3. It shall be prohibited to cause or permit a road to be used, constructed, altered or repaired without taking at least the following precautions:
   a) Application of asphalt, oil, water or suitable chemicals on heavily traveled dirt streets as necessary.
   b) Paving of public or commercial parking surfaces having more than five parking spaces.
   c) Removal as necessary from paved street and parking surfaces of earth or other material which have a tendency to become airborne.

4. Alternate means of control may be approved by the Executive Director.

IV. EMISSION STANDARDS FOR PARTICULATE MATTER

A. Fossil Fuel Fired Steam Generators

1. Maximum Emissions

   a) Solid fossil fuel fired units (any size): 0.3 lb/MM Btu heat input, 2 hr average
   b) Oil or gas fired units with greater than 2500 MM Btu/hr heat input: 0.1 lb/MM Btu heat input, 2 hr average

B. General Standards

1. Maximum Emissions

   a) use $E = 0.048q^{0.62}$

   where: E = allowable emission rate in lb/hr; and
   q = stack effluent rate in ACFM.

IV. EMISSION STANDARDS FOR PARTICULATE MATTER (CONTD.)

b) Correction of standard in a) for Effective Stack Height.

i) Multiply maximum rate determined in a) by correction factor (C.F.) determined as follows:

$$C.F. = \left(\frac{\text{Effective Stack Height}}{\text{Standard Effective Stack Height}}\right)^2$$

ii) To determine Standard Effective Stack Height, H_e, in i) use:

$$H_e = 1.05q^{0.35}$$

where: H_e is the standard effective stack height, ft; and q is the stack gas flow rate in ACFM.

iii) Effective Stack Height $H_{eff.}$ (in i):

$$H_{eff.} = h + 0.083\ V_e D_e \left[1.5+0.82\left(\frac{Te-550}{T_e}\right)D_e\right]$$

where:

$H_{eff.}$ = effective stack height, ft
h = physical stack height above ground level in ft
V_e = stack gas exit velocity, ft/sec
D_e = stack exit inside diameter, ft
T_e = stack exit temperature, °R

C. Incinerators

1. It shall be prohibited to cause or permit the use of a single-chamber incinerator unless approved by the Board upon demonstration that it will provide equivalent performance to multiple-chamber incinerators.

V. EMISSION STANDARDS FOR SULFUR COMPOUNDS

A. Sulfur Dioxide (SO_2) Standards

1. Sulfur Recovery Plants

a) Maximum Emissions

Stack effluent flow rate $\leq$ 4000 SCFM:

V. EMISSION STANDARDS FOR SULFUR COMPOUNDS (CONTD.)

use $E = 123.4 + 0.091q$

where: E = allowable SO_2 emission rate in lb/hr; and
q = stack effluent flow rate in SCFM.

Stack effluent flow rate > 4000 SCFM:

use $E = 0.614q0.8042$

where: (E and q are the same as above)

b) Correction of standard in a) for Effective Stack Height.

i) Multiply maximum emission rate in a) by correction factor (C.F.) determined as follows:

$$C.F. = \left[\frac{\text{Effective Stack Height}}{\text{Standard effective stack height}}\right]^2$$

ii) Standard Effective Stack Height, H_e:

for ≤ 4000 SCFM stack gas rate -

$$H_e = 7.4\,[123.4 + 0.091q]^{0.5}$$

where: H_e is the standard effective stack height, ft; and q is the stack gas flow rate in SCFM.

for > 4000 SCFM stack gas rate -

$$H_e = 5.8q^{0.402}$$

(H_e and q are defined as above)

iii) Effective Stack Height, H_{eff}:

$$H_{eff.} = h + 0.083v_eD_e\,[1.5 + 0.82\left(\frac{Te-550}{T_e}\right)De]$$

where:
$H_{eff.}$ = effective stack height, ft
h = physical stack height above ground level in ft
V_e = stack gas exit velocity, ft/sec
D_e = stack exit inside diameter, ft
T_e = stack gas exit temperature, °R

V. EMISSION STANDARDS FOR SULFUR COMPOUNDS (CONTD.)

2. Fuel Burning Equipment (Fossil Fuel Fired Steam Generators)

a) Solid fossil fuel fired units.

i) Maximum SO_2 Emission Rate
3.0 lb/MM Btu heat input

ii) In addition to the requirements of i), new proven technology must be applied in removing SO_2 from effluent gases when such technology becomes available

b) Liquid fossil fuel fired units.

i) Maximum SO_2 Emission Concentration
440 ppm (by vol.)

ii) Correction of standard for effective stack height. If effective stack height is less than the standard effective stack height (both as determined by the method in V.A.1.b) above), use the correction factor (multiplier) as determined using the formula in V.A.1.b) to obtain the correct reduced maximum emission rate.

3. Net Ground Level SO_2 Concentration.

a) Affected facilities: subsection b) covers sources in all counties except those covered by c) and d) below.

b) Maximum Net Ground Level Concentration - General

i) 0.4 ppm, 30 min. average

ii) Exemptions. Affected facilities, except those in El Paso County, are exempt from requirements of i) when a source meets both of the following:
(1) Any applicable Federal New Source Performance Standard and utilizes best available control technology, with consideration to the technical practicability and economic reasonableness of reducing or eliminating the emissions.

V. EMISSION STANDARDS FOR SULFUR COMPOUNDS (CONTD.)

(2) Does not cause or contribute to a condition such that either the primary or the secondary sulfur dioxide air quality standards are exceeded in the area.

c) Maximum Net Ground Level Concentration - Galveston and Harris Counties

0.28 ppm, 30 min. average

d) Maximum Net Ground Level Concentration - Jefferson and Orange Counties

0.32 ppm, 30 min. average

4. Maximum SO_2 emission rates for sources not regulated by subsections 1. and 2. of this section may be set by the Air Control Board as necessary to attain applicable ambient air quality standards.

5. Any person or persons who own or operate a source or sources which emit sulfur dioxide may request the Texas Air Control Board for relief from the requirements of subsection 3. by filing with the Executive Director an application for an Area Control Plan. An application for an Area Control Plan shall include, but is not limited to, a combination of evidence that best available control technology is being employed at all the affected sources, having due regard for the technical practicability and the economic reasonableness of reducing or eliminating the emissions of sulfur dioxide resulting from the affected facilities; and an ambient air sampling system for the recording of sulfur dioxide levels in the affected area. Any person or persons filing an Application for an Area Control Plan must demonstrate the capability of all sources in the affected area of the State to maintain all promulgated sulfur dioxide ambient air standards. Upon recommendation by the Executive Director, the Board may enter a Board Order exempting those sources who have filed such an Application.

B. Hydrogen Sulfide (H_2S) Standards

1. Maximum net ground level concentrations

a) where downwind H_2S concentration affects property used for residential, business or commercial purposes:

0.08 ppm, 30 min. average

V. EMISSION STANDARDS FOR SULFUR COMPOUNDS (CONTD.)

b) where downwind H_2S concentration affects only property used for other than residential, recreational, business or commercial purposes (such as industrial, vacant tracts, or range lands not normally occupied by people)

0.12 ppm, 30 min. average

C. Sulfuric Acid (H_2SO_4) Standards

1. Maximum Emissions Concentration

All sources shall comply with the following maximums:

a) Net ground level H_2SO_4 concentration: 15 ug/m^3 of air, 24 hr average;
b) Net ground level H_2SO_4 concentration: 50 ug/m^3 of air, 1 hr average, measured more than once during any 24 hr period; and
c) A concentration of 100 ug/m^3 of air at any time.

VI. STANDARDS FOR VOLATILE CARBON COMPOUNDS

A. Definitions

1. "Carbon Compounds" means those, excluding CO_2, which contain carbon in combination with any other element or elements. Hydrocarbons, containing hydrogen and carbon, are one category of carbon compounds.

2. "Volatile Carbon Compound" means any carbon compound or mixture of carbon compounds which has an aggregate vapor pressure of 1.5 pounds per square inch absolute or greater under actual conditions of storage or use.

B. Applicability

This section VI is not a statewide or generally applicable standard in Texas; it shall, however, apply throughout the following counties:

Aransas, Bexar (San Antonio), Brazoria, Calhoun, Dallas (city of Dallas), El Paso, Galveston, Harris (Houston),

VI. STANDARDS FOR VOLATILE CARBON COMPOUNDS (CONTD.)

Hardin, Jefferson, Matagorda, Montgomery, Nueces, Orange, San Patricio, Tarrant (Fort Worth), Travis (Austin), and Victoria.

C. Storage of Volatile Carbon Compounds

1. No person shall place, store or hold in any stationary tank, reservoir or other container of more than 25,000 gallons capacity any volatile carbon compounds unless such tank, reservoir or other container is a pressure tank capable of maintaining working pressures sufficient to prevent vapor or gas loss to the atmosphere or is designed and equipped with one of the following vapor loss control devices:
    a) A floating roof, consisting of a pontoon type, double deck type roof or internal floating cover, which will rest on the surface of the liquid contents and be equipped with a closure seal or seals to close the space between the roof edge and tank wall. This control equipment shall not be permitted if the volatile carbon compounds have a vapor pressure of 11.0 pounds per square inch absolute or greater under actual storage conditions. All tank gauging and sampling devices shall be gas-tight except when gauging or sampling is taking place.
    b) A vapor recovery system which reduces the emissions such that the aggregate partial pressure of all volatile carbon compound vapors in vent gases or other material emitted to the atmosphere will not exceed a level of 1.5 psia.

2. No person shall place, store or hold in any new stationary storage vessel of more than 1,000 gallon capacity, any volatile carbon compound unless such vessel is equipped with a permanent submerged fill pipe or is a pressure tank as described in C.1. fitted with a vapor recovery system as described C.1.b).

D. Loading and Unloading Facilities

1. a) No person shall permit the loading or unloading of volatile carbon compounds from any loading facility having 20,000 gallons or more throughput per day, averaged over any 30-day period, unless such facility is equipped with a vapor recovery system which reduces the emissions such that the aggregate partial pressure of all volatile carbon compound vapors in vent gases or other material emitted to the atmosphere will not exceed a level of 1.5 psia.

VI. STANDARDS FOR VOLATILE CARBON COMPOUNDS (CONTD.)

b) When loading or unloading is effected through the hatches of a tank truck or trailer or railroad tank car with a loading arm equipped with a vapor collecting adaptor, then pneumatic, hydraulic, or other mechanical means shall be provided, to force a vapor-tight seal between the adaptor and the hatch. A means shall be provided to prevent liquid drainage from the loading device when it is removed from the hatch of any tank truck, trailer or railroad tank car, to accomplish complete drainage before such removal. When loading or unloading is effected through means other than hatches, all loading and vapor lines shall be equipped with fittings which make vapor-tight connections and which close automatically when disconnected or equipped to permit residual volatile carbon compounds in the loading line to discharge into a recovery or disposal system after loading is complete.

E. Volatile Carbon Compound - Water Separation

1. No person shall use any compartment of any single or multiple compartment volatile carbon compound water separator which compartment receives 200 gallons or more of volatile carbon compounds a day unless such compartment is controlled in one of the following ways:
   a) The compartment has all openings sealed and totally encloses the liquid contents. All gauging and sampling devices shall be gas-tight except when gauging or sampling is taking place.
   b) The compartment is equipped with a floating roof or internal floating cover which will rest on the surface of the contents and be equipped with a closure seal or seals to close the space between the roof edge and tank wall. All gauging and sampling devices shall be gas-tight except when gauging or sampling is taking place.
   c) The compartment is equipped with a vapor recovery system which reduces the emissions such that the aggregate partial pressure of the volatile carbon compound vapors in vent gases or other material emitted to the atmosphere will not exceed a level of 1.5 psia.

F. Waste Gas Disposal

1. No person shall emit a waste gas stream from any process vent containing one or more of the specific carbon compounds listed in 1.a) below or one or

VI. STANDARDS FOR VOLATILE CARBON COMPOUNDS (CONTD.)

more compounds which are members of one or more of the classes of carbon compounds listed in 1.b) unless the waste gas stream is burned properly at a temperature equal to or greater than 1300°F in a smokeless flare or a direct-flame incinerator before it is allowed to enter the atmosphere; alternate means of control may be approved by the Executive Director in accordance with subsection G.

a) Emission of the following specific carbon compounds shall be regulated under subsection F.:

Butadiene
Isobutylene
Styrene
Isoprene
Propylene
2-Methyl-Styrene

b) Emission of the following classes of carbon compounds shall be regulated under subsection F.1.:

Aldehydes
Alcohols
Aromatics
Ethers
Olefins
Peroxides
Amines
Acids
Esters
Ketones
Sulfides
Branched chain hydrocarbons (C_8 and above)

c) The following waste gas streams are exempt from the requirements of F.1.:

i) Any waste gas stream having a combined weight of the carbon compounds or classes of compounds specified in 1.a) and 1.b) equal to or less than 100 pounds in any consecutive 24-hour period.

ii) Any waste gas stream having a combined weight of the carbon compounds or classes of compounds specified in 1.a) and 1.b) greater than 100 pounds but less than 250 pounds per hour averaged over any consecutive 24-hour period and having an aggregate partial pressure of the carbon compounds and classes specified in 1.a) and 1.b) less than .44 psia.

VI. STANDARDS FOR VOLATILE CARBON COMPOUNDS (CONTD.)

2. No person shall emit in any one calendar year more than five tons of total carbon compounds excluding methane in a waste gas stream from any catalyst regeneration of a petroleum or petrochemical process system, or fluid-coking unit into the atmosphere unless the waste gas stream is properly burned at a temperature equal to or greater than 1300°F in a direct-flame incinerator or boiler.

3. Subsection F is not intended to require incineration as an exclusive method of control. In no event shall a waste gas stream be incinerated if the incineration will have no practical effect in reducing the emission of air contaminants or will result in an actual degradation of air quality. In all such cases, application shall be made to the Executive Director for approval of an alternate method of control. The Executive Director shall approve such alternate method if it represents the best available alternative having due regard for the intent of subsection F. and the effect of the emissions on ambient air quality.

G. Any person affected by any part of this section VI may request the Executive Director to approve alternate means of control. The Executive Director shall approve such control means if it can be demonstrated that such means will be substantially equivalent to the methods of control approved by this section.

H. The Executive Director, after consultation with appropriate local governmental agencies, may exempt specific compounds or a specific waste gas stream from the application of this section if it can be demonstrated that the emissions from the compound or specific waste gas stream will not make a significant contribution of air contaminants.

VII. EMISSION STANDARDS FOR NITROGEN COMPOUNDS

A. Gas Fired Steam Generating Units

1. Affected Facilities: Sources in only the Dallas-Fort Worth and Houston-Galveston Air Quality Control Regions.

VII. EMISSION STANDARDS FOR NITROGEN COMPOUNDS (CONTD.)

2. Definitions.

   a) An "opposed fired" steam generating unit is a unit having burners installed on two opposite vertical firebox surfaces.
   b) A "front fired" steam generating unit is a unit having all burners installed in a geometric array on one vertical firebox surface.
   c) A "tangential fired" steam generating unit is a unit having burners installed on all corners of the unit at various elevations.

3. Maximum Emissions (NO_x expressed as NO_2)

   a) "Opposed fired" units of more than 600,000 lb/hr continuous steam capacity: 0.7 lbs/MM Btu heat input, max. 2 hr avg, at max. steam capacity.
   b) "Front fired" units of more than 600,000 lb/hr continuous steam capacity: 0.5 lbs/MM Btu heat input, max. 2 hr avg, at max. steam capacity.
   c) "Tangential fired" units of more than 600,000 lb/hr continuous steam capacity: 0.25 lb/MM Btu heat input, max. 2 hr avg, at max. steam capacity.

VIII. EMISSION STANDARDS FOR TOXIC MATERIALS

A. General

1. This standard establishes air standards for Texas as to inorganic fluoride compounds and beryllium. Additional standards covering other toxic materials will be adopted as sufficient data relating to undesirable levels of such other materials is developed and evaluated.

2. Definitions.

   a) Inorganic Fluoride Compounds. All inorganic chemicals having one or more atoms of fluorine in their chemical structure.

B. Standards for Inorganic Fluoride Compounds

1. Maximum Emissions
   (Gaseous inorganic fluorides, expressed as HF)

   a) 6 ppb (by vol.), 3-hr average.

VIII. EMISSION STANDARDS FOR TOXIC MATERIALS (CONTD.)

b) Cumulative emission contributions. Contributions of the contaminant by a single property shall be measured by stack sampling or by determining the difference between upwind level and downwind level of inorganic fluoride compounds for that source property. Stack sampling is the preferred method where feasible. (Details of both methods are set forth in the appendices of the Texas air regulations.)

C. Standards for Beryllium

1. Maximum Emission Concentration
   0.01 ug/m^3, 24-hr average

2. Cumulative emission contributions.

   The contribution of beryllium by a single property shall be measured by the difference between the upwind level and the downwind level of beryllium for the property, or by stack sampling, calculated to a downwind concentration. (Calculations to be in accordance ccordance with procedures outlined in the appendices of the Texas air regulations.)

IX. STANDARDS FOR NEW STATIONARY SOURCES

A. The Federal regulations for new stationary emission sources (40 CFR, Part 60) are incorporated by reference. The portions of these Federal regulations relevant to this project have been synopsized herein; this synopsis may be found under the "Federal EPA Regulations and Standards" section of this report.

B. The Federal regulations incorporated herein because relevant or partially relevant to facilities within the scope of this project cover the following listed plants or facilities:

1. Fossil-fuel Fired Steam Generators (40 CFR, Part 60, Subpart D).
2. Incinerators (40 CFR, Part 60, Subpart E).
3. Storage Vessels for Petroleum Liquids (40 CFR, Part 60, Subpart K).

TEXAS: STANDARDS OF PERFORMANCE FOR STATIONARY SOURCES

IX. STANDARDS FOR NEW STATIONARY SOURCES (CONTD.)

4. Petroleum Refineries (40 CFR, Part 60, Subpart J).

5. Coal Preparation Plants (40 CFR, Part 60, Subpart Y).

6. Also proposed Federal regulations covering lignite fired steam generators (will be found in 40 CFR, Part 60, when issued).

X. EMISSION STANDARDS FOR HAZARDOUS AIR POLLUTANTS

A. Standards

1. Regulations for the substances covered in the National Emission Standards for Hazardous Air Pollutants (40 CFR, Part 61) are incorporated by reference in Texas air regulations. Of these incorporated regulations the regulation for Mercury emissions is relevant to this project and therefor incorporated herein. A synopsis of the Federal regulations for Mercury (a designated Hazardous Air Pollutant) may be found in the "Federal EPA Regulations and Standards" portion of this report.

TEXAS INDUSTRIAL SOLID WASTE DISPOSAL

Basis: Texas Regulation on Industrial Waste Management, December 1975

Agency: Texas Water Quality Board

Note: The recordkeeping, permit and detail notification requirements are not provided herein, as they are not directly applicable to the engineering design of a facility.

I. Definitions

A. "Disposal Site" - Includes all land, facilities, fixtures, structures, and appurtenances for receiving, handling, processing, storing, retaining, or disposing of industrial solid waste.

B. "Industrial Hazardous Waste" - Means any waste or mixture of waste which, in the judgment of the Executive Director, is toxic, corrosive, flammable, a strong sensitizer or irritant, generates sudden pressure by decomposition, heat or other means and would therefore be likely to cause substantial personal injury, serious illness, or harm to human and other living organisms.

C. "Industrial Solid Waste" - Solid waste resulting from or incidental to any process of industry or manufacturing or mining or agricultural operation, including discarded or unwanted solid materials suspended or transported in liquids, and discharged or unwanted materials in liquid or semi-liquid form.

D. "Off-Site Disposal" - A disposal operation in which a generator or shipper transports industrial waste to a receiver for disposal.

E. "On-Site Disposal" - A disposal in which a generator disposes of industrial solid waste within the boundaries of a tract of land which is owned and controlled by the generator and which tract of land is located within 50 miles of the generator facility from which the waste is produced.

II. Prohibitions

A. The collection, handling, storage and/or disposal of industrial solid waste in such a manner to cause any of the following is prohibited:

II. Prohibitions (Contd.)

1. The discharge or threat of discharge of waste into or adjacent to the ground or surface waters of the State.
2. The creation of maintenance of a nuisance.
3. The endangerment of the public health and welfare; and or
4. The disposal of industrial solid waste in an unauthorized site by either the generator or carrier.

III. Technical Guidelines

A. The Texas Water Quality Board will make available copies of technical guidelines which have been developed by the Board's staff. The guidelines outline methods deemed adequate for solid waste disposal.

B. These guidelines are suggestive only and other procedures which have been determined by the Board to be equally effective may be used.

IV. Exclusions

A. Disposal sites for soil, dirt, rock, sand and other material and man-made inert solid materials to fill and;

B. Disposal of waste from exploration, development or production of oil and gas;

C. Radioactive wastes.

V. Non-Commercial Operations (On-Site)

A. Any person who plans "on-site disposal" shall notify the Board and submit such information as may be required for a determination if a permit is required.

UTAH WATER QUALITY STANDARDS

Basis: Standards of Quality for Waters of the State, Part II Code of Waste Disposal Regulations (Reprinted April 1976).

Agency: Utah State Board of Health, Water Pollution Control Broad.

I. STANDARDS OF QUALITY FOR WATERS OF THE STATE (PART II)

A. Scope

The standards shall be applied to waste discharges or to waters of the state as appropriate, except that no waste of any kind shall be discharged from controlled areas until it has been subjected to at least secondary treatment.

B. Class "A" Waters

1. Scope

Class "A" waters shall be protected against controllable pollution including heat, to be suitable at all times without treatment for domestic water supplies, irrigation, stock watering, fish and wildlife propagation, recreation and industrial supplies.

2. Prohibited Discharges

Discharges in such a way as to interfere with this class of water use or to cause the following specific standards to be violated are prohibited:

a. Physical, chemical, and bacteriological standards shall be prescribed for drinking water by the "Public Health Service Drinking Water Standards; 1962".

b. pH shall not exceed the range of 6.5 to 8.5.

c. Waters shall be essentially free from organic substances measured by BOD.

C. Class "B" Waters

1. Scope

Class "B" waters shall be protected against controllable pollution, including heat, to be suitable for domestic water supplies which are treated by disinfection only. They shall also be suitable without treatment for irrigation, stock watering, fish and wildlife propagation, recreation and industrial supplies.

I. STANDARDS OF QUALITY FOR WATERS OF THE STATE (PART II) (CONTD.)

2. Prohibited Discharges

Discharges in such a way as to interfere with this class of water uses, or to cause a violation of the following specific standards are prohibited:

a. Physical, chemical, and bacteriological standards shall be prescribed for drinking water by "Public Health Service Drinking Water Standards, 1962".

b. pH shall not exceed range of 6.5 to 8.5.

c. Essentially free from organic substances measured by BOD.

d. Coliform - shall not exceed 50/100 ml (monthly arithmetical mean); except that 20% of samples may exceed the standard if no more than 5% exceed 100/100 ml.

D. Class "C" Waters

1. Scope

This water use classification shall be protected as shown for Class "A" and Class "B" waters except that for domestic waters which are treated by coagulation, sedimentation, filtration and disinfection.

2. Prohibited Discharges

a. Materials which settle to form objectionable deposits;

b. Floating debris, oil, scum and other matter;

c. Substances producing objectionable color, odor, taste or turbidity;

d. Substances causing a violation of the following specific standards:

1. Standards as prescribed by "Public Health Service Drinking Water Standards".

2. pH shall not exceed 6.5 to 8.5 nor change more than 0.5 pH unit from other than natural causes.

I. STANDARDS OF QUALITY FOR WATERS OF THE STATE (PART II) (CONTD.)

3. Coliform - shall not exceed 5000/100 ml (monthly arithmetical mean); except that 20% of samples may exceed the standard if no more than 5% of all samples exceed a coliform density of 20,000/100 ml; AND fecal coliform density shall not exceed 2000/100 ml (monthly arithmetical mean).

4. BOD shall not exceed 5 mg/l (monthly arithmetical mean); except that 20% may exceed this value if no more than 5% of samples exceed BOD of 10 mg/l.

5. Dissolved Oxygen shall not be less than 5.5 mg/l.

UTAH: STANDARDS OF PERFORMANCE FOR STATIONARY SOURCES

Agency: Utah Air Conservation Committee

I. General Provisions

A. Definitions

1. "Committee" means Utah Air Conservation Committee.

2. "Air contaminant" means any particulate matter or any gas, vapor, suspended solid or any combination thereof, excluding steam and water vapors.

B. General Standards

1. Air Quality Degradation Regulated.

In areas of present high air quality where measured or estimated ambient levels of controllable pollutants are below the levels specified by applicable standards, any emission of pollutant to the ambient air must be shown to result in pollution levels within applicable ambient air standards and will be prohibited in any case unless shown to be controlled to afford the highest efficiencies and the lowest discharge rates that are reasonable and practicable as specified in subsection B.2. below.

2. Requirements of Pollution Control Equipment Specified.

In all areas of the State, air pollution control equipment and processes shall be selected and operated so as to afford the highest efficiencies and the lowest discharge rates that are reasonable and practicable. Reasonableness and practicability as determined by the Committee shall take into account, among other things, the concentration and characteristics of the air contaminant in the gas stream, technical feasibility for control, and cost benefit relationships.

II. Visible Emission Standards

A. Affected facilities: all installations except internal combustion engines.

B. Definitions.

1. "Ringlemann Chart" means the chart published by the U. S. Bureau of Mines (Information Circular 7718) which illustrates graduated shades of grey to black for use in determining the light obscuring capability of particulate matter.

II. Visible Emission Standards (Contd.)

2. "Equivalent opacity" means the relationship of opaqueness or percent obstruction of light to Ringlemann Chart values for shades other than black and is approximately equal to the following:

Equivalent Opacity (%)	Ringlemann No.
20	1
40	2
80	4

C. Emission Standards.

Maximum emissions
Shade or density no darker than No. 1 Ringlemann (20% black) or equivalent opacity.

D. Exceptions.

1. An emission failing to meet the standard because of the effect of uncombined water shall not be in violation.

2. Stationary operating diesel engines shall have the same limitation as in C except that the limitation may be exceeded for not more than 3 minutes in any hour.

3. Excessive emissions for malfunctions, start-up, blowdown, planned maintenance and the like shall not be violations if proper reporting requirements are complied with.

III. Emission Standards for Particulate Matter

A. Affected facilities: Process units or systems emitting 100 tons or more of particulates annually, based on zero control (excluding particulates which are the products of combustion of fuel oil, LPG or natural gas); coal-fired steam electric power generating units, coal-fired space heating units with rated input capacities of 10 MM Btu's per hour or greater.

B. Emission Standard *
85% control of particulate emissions (based on source emissions at maximum operating capacity with control devices not operating).

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* Subject to further restrictions in these regulations pertaining to visible emissions (Section II), and general limitations (subsection IB).

IV. Standards for Sulfur and Sulfur Compounds

A. Sulfur Content in Fuels

1. Standards for fuels in fuel burning or process installations.

Coal - 1.0% S (by weight), maximum
Oil - 1.5% S (by weight), maximum

2. Exemptions. An exemption from the standards of A.1. may be applied for and will be granted where the Committee is satisfied that control equipment being used is controlling sulfur emissions to a greater degree than the limitations in A.1.

B. Emission Standards for Sulfur Compounds

1. Affected facilities: Installations with a potential for emission of sulfur compounds as gaseous or mist effluent.

2. Emission Standards

a) Emissions of sulfur compounds shall be controlled so as not to exceed sulfur oxides limitations in the National Ambient Air Quality Standards (Primary and Secondary) and in the Federal Standards of Performance for New Stationary Sources.

b) Any gases by-passing a desulfurization unit during a period of scheduled maintenance shall be otherwise processed by available gas-cleaning equipment normally in use regardless of whether a temporary variance or exception is granted as to 2.a).

V. Standards for New Stationary Sources

A. The Federal regulations for new stationary emission sources (40 CFR, Part 60) are incorporated. The portions of these Federal regulations relevant to this project have been synopsized herein and this synopsis may be found under the "Federal EPA Regulations and Standards" section of this report.

B. The Federal regulations incorporated herein because relevant or partially relevant to fossil-fuel conversion facilities within the scope of this project cover the following listed plants or facilities:

1. Fossil-fuel fired steam generators (40 CFR, Part 60, Subpart D).

UTAH: STANDARDS OF PERFORMANCE FOR STATIONARY SOURCES

V. Standards for New Stationary Sources (Contd.)

2. Incinerators (40 CFR, Part 60, Subpart E).
3. Storage Vessels for Petroleum Liquids (40 CFR, Part 60, Subpart K).
4. Petroleum Refineries (40 CFR, Part 60, Subpart J).
5. Also, proposed Federal regulations covering lignite fired steam generators (will be found in 40 CFR, Part 60 when issued).

UTAH SOLID WASTE DISPOSAL REGULATIONS

Basis:	Code of Solid Waste Disposal Regulations July 1974
Agency:	State Department of Social Services, Division of Health, Bureau of Solid Waste Management
Note:	(1) Industrial facilities icluding coal processing facilities are handled on a case-by-case basis as reviewed in a pre-design or pre-construction conference.

I. Hazardous and Special Waste Disposal

(Interpretation of the Utah State Code of Solid Waste Disposal Regulations)

A. Approval for Disposal of Hazardous Wastes will depend upon the following:

1. Location of hazardous waste disposal area;
2. Consideration of pertinent geological data;
3. Responsible control of hazardous waste disposal sites;
4. Precautions to protect all surface and ground waters.

B. Operational Requirements Incuded but Not Limited to the Following:

1. Acceptance of hazardous material is to be determined on a case-by-case basis with regard to type of waste, total volume, and other factors pertinent to immediate and long range protection.
2. Disposition at the site must be approved in advance by the local health jurisdiction.
3. Hazardous materials are to be covered with earth fill immediately after deposition.

II. Code of Solid Waste Disposal Regulations

A. Indiscriminate Dumping

1. It shall be unlawful for any person to deposit any solid waste in any place except at a site which has been so designated to accept such wastes.

II. Code of Solid Waste Disposal Regulations (Contd.)

B. Site Operation

The site operation criteria provides operational requirements such as, but not limited to, adequate fire protection, adequate supervision, proper fill and compaction, and provisions for litter and dust control. There are no direct applicable design requirements provided by this section.

VIRGINIA WATER QUALITY STANDARDS

Basis: Water Quality Standards (November 1974)

Agency: State Water Control Board

I. GENERAL STANDARDS (Statewide Application)

A. State waters shall be maintained at such quality as will permit all reasonable and beneficial uses.

B. All state waters shall be free from:

1. Substances attributable to sewage and industrial waste which nclude but not limited to:

   a. Floating debris;
   b. Oil;
   c. Scum and other floating materials;
   d. Toxic substances;
   e. Substances that produce color, tastes, and odors;
   f. Substances that settle to form sludge deposits; and
   g. Heated substances.

C. In addition to other standards established for the protection of public water suplies; the following standards shall apply at the raw water intake point.

Constitutent	Concentration
Physical	
Color (color units)	75
Inorganic Chemicals	mg/l
Alkalinity	30-500
Arsenic	0.05
Barium	1.0
Boron	1.0
Cadmium	0.01
Chloride	250.0
Chromium, hexavalent	0.05
Copper	1.0
Fluoride	1.7
Iron (filterable)	0.3
Lead	0.05
Manganese (filterable)	0.05
Nitrates plus Nitrites (as N)	10.0
Selenium	0.01
Silver	0.05
Sulfate	250.0
Total Dissolved Solids (filterable residue)	500.0
Uranyl Ion	5.0

VIRGINIA WATER QUALITY STANDARDS

II. RULES WITH SPECIFIC APPLICATION BASED ON CLIMATE, GEOGRAPHICAL AREA OR USES (CONTD.)

MAJOR CLASS	GEOGRAPHICAL AREA OR OTHER DESCRIPTION OF WATERS	DISSOLVED OXYGEN mg/l		pH	TEMPERATURE °F**	
		Minimum	Daily Average		Rise above Natural*	Maximum
I	Open Ocean (Seaside of the Land Mass)	5.0	--	6.0-8.5	4.0(Sept.-May) 1.5(June-Aug.)	-- --
II	Estuarine (Tidal Water - Coastal Zone to Fall Line)	4.0	5.0	6.0-8.5	4.0(Sept.-May) 1.5(June-Aug.)	-- --
III	Free Flowing Streams (Coastal Zone and Piedmont Zone to the Crest of the Mountains)	4.0	5.0	6.0-8.5	5	90
IV	Mountainous Zone	4.0	5.0	6.0-8.5	5	87
V	Put and Take Trout Waters	5.0	6.0	6.0-8.5	5	70
VI	Natural Trout Waters	6.0	7.0	6.0-8.5	5***	68

* Natural temperature due solely to natural conditions without the influence of any point source discharge.

** A maximum hourly temperature change of 2°F is to apply beyond the boundaries of mixing zones and does not apply top temperatures caused by natural conditions.

***Any rise above natural temperature to be allowed by the Board shall be determined on a case-by-case basis, but in no instance shall exceed 5°F.

VIRGINIA WATER QUALITY STANDARDS

I. GENERAL STANDARDS (Statewide Application) (CONTD.)

Constitutent	Concentration
Organic Chemicals	mg/l
Carbon Chloroform Extract	0.15
Cyanide	0.20
Methylene blue active substances	0.5
Phenols	0.001
Raidoactivity	pCi/l
Gross beta	1000
Radium-226	3
Strontium-90	10

D. Temperature (Lakes and Inpoundments)

1. Temperature of the epilimnion (in those areas where important organisms are likely to be adversely affected) shall not be raised more than 3° F above the ambient temperature. The increase of temperature is to be based on the monthly average of the maximum daily temperature.

E. Anti-degradation

Waters whose existing quality is better than the established standards will be maintained at the high quality; provided that the State Water Quality Board has the power to authorize any project which would create a new or increased discharge of effluent to high quality water provided that the necessary degree of waste treatment to maintain high water quality will be required.

II. RULES WITH SPECIFIC APPLICATION BASED ON CLIMATE, GEOGRAPHICAL AREA OR USES

A. Primary Classification of Waters within the State

VIRGINIA WATER QUALITY STANDARDS

III. SUBCLASSES TO COMPLEMENT MAJOR WATER CLASS DESIGNATIONS

A. Subclass A

1. Applicability

Waters which are generally satisfactory for use as public or municipal water supply, secondary contract recreation, propagation of fish and aquatic life, and other beneficial uses.

2. Coliform Organisms

a. Fecal Coliform (logmean)	$\leq$1000/100 ml not to equal or exceed $\leq$200/100 ml in more than 10% of samples

B. Subclass B

1. Applicability

Waters which are generally satisfactory for use as public or municipal water supply, primary contact recreation (considerable risk of ingestion), propagation of fish and other aquatic life, and other beneficial uses.

2. Coliform Organisms

a. Fecal Coliforms (30 day logmean)	$\leq$200/100 ml not more 400/100 ml in 10% of samples

IV. APPLICATION OF STANDARDS

A. Based on climate, geographical location, or type, all waters will be assigned a major class (I-VI above) and a subclass A or B to indicate appropriate coliform standard, as well as the required specific water quality criteria applicable to the particular receiving water.

B. All waters within the state shall be satisfactory for fishing and secondary contact recreation.

VIRGINIA: STANDARDS OF PERFORMANCE FOR STATIONARY SOURCES

Agency: State Air Pollution Control Board

I. General Provisions

A. Definitions

1. "Opacity" means the degree to which emissions reduce the transmission of light and obscure the view of an object in the background, expressed as a percentage.

2. "Best available control technology" shall be determined on a case-by-case basis considering the following:

   a) The process, fuels and raw material available and to be employed in the facility involved;
   b) The engineering aspects of the application of various types of control techniques which have been adequately demonstrated;
   c) Process and fuel changes;
   d) The respective costs of application of all such control techniques, process changes, alternative fuels, etc.;
   e) Any applicable emission standards; and
   f) Location and siting considerations.

3. "Fossil Fuel" means natural gas, petroleum, coal and any form of solid, liquid or gaseous fuel derived from such material for the purpose of creating useful heat.

II. Visible Emission Standards

A. Maximum Emissions

20 % opacity

B. Exceptions

1. It shall not be a violation where the presence of uncombined water is the only reason for failure to meet the requirements of this section.

2. Opacity standards herein shall not apply during periods of startup, shutdown, or malfunction.

III. Emission Standards for Fugitive Dust

A. General

1. Definition. "Fugitive Dust" means solid airborne particulate matter or dust emitted from any source other than a flue, a stack, or open burning.

III. Emission Standards for Fugitive Dust (Contd.)

2. Affected facilities: Any facility that emits or causes fugitive dust.

B. Control Standards

1. During the construction, modification or operation phase of a stationary source or any other building, structure, facility or installation, no person shall cause, allow or permit any materials to be handled, transported or stored; or a building, its appurtenances or a road to be used, constructed, altered, repaired or demolished without taking reasonable precautions to prevent particulate matter from becoming airborne. Such reasonable precautions may include, but are not limited to the following:

   a) Use, where possible, of water or chemicals for control of dust in the demolition of existing buildings or structures, construction operations, the grading of roads or the clearing of land;

   b) Application of asphalt, oil, water or suitable chemicals on dirt roads, materials stockpiles and other surfaces which can create airborne dust;

   c) Installation and use of hoods, fans and fabric filters to enclose and vent the handling of dusty materials. Adequate containment methods shall be employed during sandblasting or other similar operations;

   d) Open equipment for conveying or transporting materials likely to become airborne which would create objectionable air pollution shall be covered, or treated in an equally effective manner at all times when in motion;

   e) The paving of roadways and their maintenance in a clean condition;

   f) The prompt removal of dirt or other material from paved streets over which such material has been transported by trucking or earth moving equipment or erosion by water.

IV. Emission Standards for Hazardous Air Pollutants

A. Standards for Mercury and Beryllium. The Federal regulations for mercury and beryllium emissions (40 CFR, Part 61) are incorporated by reference. Mercury and beryllium are designated Hazardous Air Pollutant in the Federal regulations. The applicable Federal regulations have been synopsized herein and may be found under the "Federal EPA Regulations and Standards" section of this report.

B. Standards for Other Hazardous Air Pollutants

1. Definition. "Hazardous air pollutant" means an air pollutant to which no ambient air quality standard is applicable and which may cause, or contribute to, an increase in mortality or an increase in serious irreversible or incapacitating reversible illness. Hazardous air pollutants include, but are not limited to the following:

   a) Materials or substances listed in 29 CFR 1910.1000 (Occupational Safety and Health threshold limits for various substances for employee protection).

   b) Substances which an owner knows or reasonably should be expected to know are hazardous air pollutants in the concentrations and at the conditions present in the ambient air as a result of emissions from an affected facility.

2. Affected facilities: Any facility that may emit a hazardous air pollutant.

3. Emission Standards

   a) Hazardous air pollutants shall not be emitted to the atmosphere in such quantities as to cause ambient air concentrations that may cause or contribute to a harmful effect.

   b) Best available control technology as approved by the Board shall be employed for the control of hazardous air pollutants.

   c) Exceptions. Mercury and beryllium (for which limitations are covered in part A. of this regulation) are not subject to the requirements of this part.

IV. Emission Standards for Hazardous Air Pollutants (CONTD.)

d) Solely as a guide for case-by-case considerations, potentially harmful ambient air concentrations shall be considered to be one-hour concentrations in excess of 1/20 of the eight-hour limit set forth in tables in 29 CFR 910.1000 (see B.l. of this section) except for those materials generally recognized as being not harmful in the ambient air. No analysis has been made of this list to determine relevant compounds and values for standards as it is anticipated that analysis of health effects and projected standards for many such currently non-criteria trace elements is to be the subject of future project work.

e) Violations of this part shall be determined on a case-by-case basis after investigation and thorough review of all data, evidence and circumstances by the Board.

V. Standards for Odorous Emissions

A. Best available control technology as approved by the Board shall be used to limit odorous emissions from any facility that emits an odor or odors.

B. After 180 days from initial startup, no odor shall be emitted from a facility such that the odor would be objectionable to a person of ordinary sensibility.

C. Exception. The standards in this rule shall not apply to accidental or other infrequent emissions.

VI. Standards of Performance for New Stationary Sources

A. The Federal regulations for new stationary emission sources (current 40 CFR, Part 60 and subsequent Federal Registers) are incorporated by reference. The portions of these Federal regulations relevant to this project have been synopsized herein and this synopsis may be found under the "Federal EPA Regulations and Standards" section of this report.

B. The new source Federal regulations incorporated herein because relevant or partially relevant to fossil-fuel conversion facilities within the scope of this project cover the following listed plants or facilities:

1. Fossil-fuel fired steam generators (40 CFR, Part 60, Subpart D).

VI. Standards of Performance for New Stationary Sources (Contd.)

2. Incinerators (40 CFR, Part 60, Subpart E).

3. Storage Vessels for Petroleum Liquids (40 CFR, Part 60, Subpart K).

4. Petroleum Refineries (40 CFR, Part 60, Subpart J).

5. Also, proposed Federal regulations covering lignite fired steam generators (will be found in 40 CFR, Part 60 when issued).

VII. Particulate Emission from Existing Fuel Burning Equipment

A. Emission Standards for Furnaces

1. No owner shall allow to be emitted into the outdoor atmosphere from any fuel burning equipment or to pass a convenient measuring point near the stack outlet, particulate matter in the flue gases to exceed the appropriate following standard:

a) For operations with total heat input less than twenty-five million (25×10^6) Btu per hour, the maximum allowable emission shall be 0.4 pounds of particulate per million Btu input.

b) For operations with total heat input between twenty-five million (25×10^6) and ten billion ($10{,}000 \times 10^6$) Btu per hour, the maximum allowable emission, in pounds per million Btu input, E, shall be determined by the following equation:

$$E = 0.8425\ H^{-0.2314}$$

where H is the total heat in millions of Btu per hour.

c) For operations with total heat input in excess of ten billion ($10{,}000 \times 10^6$) Btu per hour, the maximum allowable emission shall be 0.10 pounds of particulate per million Btu input.

For purposes of this regulation, the heat input shall be the aggregate heat content of all fuels whose products of combustion pass through a stack or stacks. The heat input value used shall be the equipment manufacturer's or designer's guarantee maximum input, or maximum continuous heat input, or maximum continuous heat input determined by test, whichever is greater. The total heat input of all fuel burning units at a plant or on a premise normally operated simultaneously shall be used for determining the maximum allowable amount of particulate matter which may be emitted.

B. Emmission Testing

Emission tests relating to this rule apply to recognized ASME methods. The approved methods are the ASME Test Code for Dust Separating Apparatus (PTC-21-1941) and the ASME Test Code for Determining Concentrations in Gas Streams (PTC-27-1957). Procedures may be adjusted or changed by the Executive Director to suit specific sampling conditions or needs based upon good practice, judgement and experience. When such tests are adjusted, consideration shall be given to the effect of such change on established emission standards.

C. Exemptions

All fuel burning equipment using solid fuel for space and domestic water heating with a Btu input of less than 350,000 Btu per hour shall be exempt from this rule.

All fuel burning equipment using gas or oil for space and domestic water heating with a Btu input of less than 1,000,000 Btu per hour shall be exempt from this rule.

VIII. Gaseous Contaminants

A. Prohibition of Gaseous Contaminant Emissions

No owner shall allow the operation of combustion installation and process equipment so as to disperse into the outdoor atmosphere gaseous contaminant emissions in such quantities or concentrations as to injure human, plant or animal life, or cause a condition of air pollution.

B. Sulfur Containing Gases and Compounds

No person shall cause suffer, allow or permit the emission from any source operation an in-stack sulfur dioxide concentration exceeding 2000 ppm by volume except as provided in the following:

1. Control of the Emission of Sulfur Dioxide from Combustion Installations.

No person shall cause, suffer, allow, or permit sulfur dioxide caused by the combustion of fuel to be discharged from all combustion installations at a given location in excess of the quantity shown in the following equation:

$S = 2.64K$, where

S = allowable emissions of sulfur oxides in pounds/hr.

K = Total capacity rating of combustion installation in Btu x 10^6/hr.

In those regions, districts, or locations where attainment of the ambient air quality standards is required, the Board may require emission performance in accordance with one of the following equations:

$S = 1.58K$

$S = 1.08K$, or

$S = 0.55K$

VIRGINIA SOLID WASTE DISPOSAL REGULATIONS

Basis: Regulations Governing Disposal of Solid Waste (1971)

Agency: Virginia Department of Health

Note: A permit must be obtained from the State Board of Health prior to constructing or operating a solid waste system.

I. General

A. Each county, city and town shall be responsible for the proper disposal of solid wastes within its jurisdiction including commercial, manufacturing and industrial wastes.

B. Counties, cities, and towns may accept solid wastes from industrial sources for disposal in the same system used for residential wastes, or they may require such solid waste source to operate separate disposal facilities which conform to the requirements outlined in the waste disposal regulations.

II. Approved Solid Waste Disposal Methods

A. Sanitary Landfills;

B. Incinerators; or

C. New or unique methods that in the opinion of the Health Commissioner can be constructed and operated without environmental degradation and creating hazards.

D. Inert solid waste may be disposed of on land without cover.

III. Sanitary Landfill

A. Requirement for Sanitary Landfill sites:

1. The size of the site must be adequate for its intended use;
2. There shall be properly maintained all-weather roads to and on the;
3. There shall be a sufficient and suitable quality of material to cover the solid waste;

III. Sanitary Landfill (Contd.)

4. The site shall be located and the operation so designed to prevent pollution of ground and surface waters.

B. Requirements for Sanitary Landfill Operation

The requirements under this section are operational standards and provide no direct applicable design criteria. Therefore, they are not included within this synopsis.

IV. Incinerators

A. Requirements for Incinerators:

1. Plans and specifications for incinerators shall be prepared by a registered engineer and subject to review and approval before construction begins.
2. The incinerator shall be designed to meet all applicable air and water pollution control rules and regulations.
3. Provisions shall be made for suitable residue disposal.
4. Hazardous waste will not be disposed of in incinerators except as approved.

V. Disposal of Hazardous Waste

A. Hazardous waste shall be disposed of only in a manner approved by the Department.

WASHINGTON WATER QUALITY CRITERIA

Basis: Washington Administrative Code (WAC) Chapter 173-201, August 1973

Agency: State of Washington Department of Ecology

I. GENERAL WATER USE AND CRITERIA

The following criteria are applicable to the various classes of waters in the state as follows:

A. Class AA (Extraordinary)

1. Characteristic of uses shall include, but are not limited to, the following:

   a. Water supply (domestic, industrial, agricultural).

   b. Wildlife habitat, stock watering.

   c. General recreation and aesthetic enjoyment.

   d. General marine recreation and navigation.

   e. Fish and shellfish production.

2. Water Quality Criteria

   a. Total Coliform Organisms (median)

      $\leq$50/100 ml (fresh water) or 70 (marine water) with less than 10% of samples exceeding 230/100 ml when associated with any fecal source.

   b. Dissolved Oxygen

      >9.5 mg/l (fresh water)
      >7.0 mg/l (marine water)

   c. Total Dissolved Gas

      <110% of saturation at any point of sample collection.

I. GENERAL WATER USE AND CRITERIA (CONTD.)

d. Temperature

$\leq 60°F$ (fresh water)
$\leq 55°F$ (marine water)

(1) Allowable temperature increase:

Fresh water $t = 75/(T-22)$
Marine water $t = 24/(T-39)$

Where:

t = allowable temperature increase, and
T = water temperature due to all causes combined

e. pH (range)

6.5 - 8.5 (fresh water)
7.0 - 8.5 (marine water)

f. Turbidity

≤ 5 JTU over natural conditions

g. Toxic, Radioactive, or Deleterious Material Concentrations

Shall be less than those which may affect public health or desirability of the water for any use.

h. Aesthetic Values

Shall not be impaired by the presence of materials which are offensive to sight, smell, touch or taste.

B. Class A (Excellent)

1. The characteristics of uses are the same as for Class AA waters (See I., A, 1 above) except commerce and navigation has been added.

2. Water Quality Criteria.

WASHINGTON WATER QUALITY CRITERIA

I. GENERAL WATER USE AND CRITERIA (CONTD.)

a. Total coliform organisms (median)

$\leq$240/100 ml (fresh water) with less than 20% of samples exceeding 1000 when associated with any fercal source or 70/100 ml (marine water) with less than 10% of samples exceeding 230 when associated with any fecal source.

b. Dissolved Oxygen

$>$8.0 mg/l (fresh water) or
$>$6.0 mg/l (marine water)

c. Total Dissolved Gas

$<$110% of saturation at any point of sample collection

d. Temperature

65°F (fresh water) or
61°F (marine water)

(1) Allowable temperature increase:

Fresh water $t = 90/(T-19)$
Marine water $t = 40/(T-35)$

Where:

t = allowable temperature increase, and
T = water temperature due to all causes combied.

e. Turbidity

$\leq$5 JTU over natural conditions.

f. pH (range)

6.5 - 8.5 (fresh water)
7.0 - 8.5 (marine water)

g. Toxic, Radioactive, or Deleterious Material Concentrations

Shall be below those of public health significance, or which may cause acute or chronic toxic conditions or adversely affect any water use.

I. GENERAL WATER USE AND CRITERIA (CONTD.)

h. Aesthetic Values

No substances which are offensive to sight, smell, touch or taste.

C. Class B (Good)

1. The characteristics of use are similar to those of Class A waters except they are to be used only as industrial and agricultural water supply.

2. Water Quality Criteria

a. Total Coliform Organisms (median)

$\leq$1000/100 ml with less than 10% of samples exceeding 2400/100 ml when associated with any fecal source.

b. Dissolved Oxygen

$>$6.5 mg/l (fresh water) or
$>$5.0 mg/l (marine water), or
70% saturation, whichever is greater

c. Total Dissolved Gas

$<$110% of saturation at any point of sample collection

d. Temperature

$\leq$70°F (fresh water)
$\leq$66°F (marine water)

(1) Allowable temperature increase:

Fresh water t = 110/T-15)
Marine water t = 52/(T-32)

Where:

t = allowable temperature increase, and
T = water temperature due to all combined causes

I. GENERAL WATER USE AND CRITERIA (CONTD.)

e. pH (range)

6.5 - 8.5 (fresh water)
7.0 - 8.5 (marine water)

f. Turbidity

≤10 JTU over natural conditions

g. Toxic, Radioactive, or Deleterious Material Concentrations

Shall be below those which adversely affect public health during the exercise of characteristic usages, or which may cause acute or chronic conditions to the aquatic biota, or which may adversely affect water use.

h. Asthetic Values

Shall not be reduced by dissolved, suspended, floating or submerged matter so as to affect water usage.

D. Class C (Fair)

1. Characteristic uses shall include, but not be limited to, the following:
   - a. Cooling water
   - b. Commerce and navigation
   - c. Fish passage
   - d. Boating.
2. Water Quality Criteria.
   - a. Total Coliform Organisms (median values)

     ≤1000/100 ml when associated with any fecal source.

WASHINGTON WATER QUALITY CRITERIA

I. GENERAL WATER USE AND CRITERIA (CONTD.)

b. Dissolved Oxygen

5.0 mg/l (fresh water) or
4.0 mg/l (marine water), or
50% saturation, whichever is greater

c. Total Dissolved Gas

<110% saturation at any point of sample collection

d. Temperature

75°F (fresh water)
72°F (marine water)

(1) Allowable temperature increase
Fresh water $t = {}^{125}/(T-12)$
Marine water $t = {}^{64}/(T-29)$

Where:

t = allowable temperature rise, and
T = water temperature due to all combined causes

e. pH (range)

6.5 - 9.0 (fresh water)
7.0 - 9.0 (marine water)

f. Turbidity

≤10 JTU over natural conditions

g. Toxic, Radioactive, or Deleterious Material Concentrations

Shall be below those which adversely affect public health during the exercise of characteristic usage, or which may cause acute or chronic toxic conditions to the aquatic biota, or which may adversely affect characteristic water uses.

h. Aesthetic Value

Shall not be interfered with by the presence of obnoxious wastes, slimes, or aquatic growths or by materials which will taint the flesh of edible species.

WASHINGTON WATER QUALITY CRITERIA

I. GENERAL WATER USE AND CRITERIA (CONTD.)

E. Lake Class

1. Characteristic uses for this class of waters include, but are not limited to, the following:

   a. Water Supply (domestic, industrial, agricultural)

   b. Wild life habitat, stock watering

   c. General recreation and aesthetic enjoyment

2. Water Quality Criteria

   a. Total Coliform Organisms (median)

      $\leq$240/100 ml with less than 20% of samples exceeding 1000/100 ml when associated with any fecal source.

   b. Dissolved oxygen

      No measurable decrease from natural conditions

   c. Total dissolved gas

      <110% of saturation at any point of sample collection

   d. Temperature

      No measurable change from natural conditions

   e. pH

      No measurable change from natural conditions

   f. Turbidity

      $\leq$5 JTU over natural conditions

   g. Toxic, Radioactive, or Deleterious Material Concentrations

      Shall be less than those which may affect public health, the natural aquatic environment, or the desirability of the water for any usage.

WASHINGTON WATER QUALITY CRITERIA

I. GENERAL WATER USE AND CRITERIA (CONTD.)

h. Aesthetic Values

Shall not be impaired by the presence of materials which offend the senses of sight, smell, touch, or taste.

II. GENERAL CONSIDERATIONS

A. Usually whenever receiving waters are of a higher quality than the criteria assigned, the existing water quality shall constitute the water quality criteria.

B. Whenever the natural conditions are a lower quality than the assigned criteria, the natural conditions shall constitute the water quality criteria.

C. NPDES Permit

The State of Washington does administer the NPDES permit program and a permit would be required for any discharge of wastes to navigable water. Effluent limitations would be imposed on such discharges consistant with EPA requirements for specific categories of industry.

WASHINGTON: STANDARDS OF PERFORMANCE FOR STATIONARY SOURCES

Agency: Department of Ecology

I. General Provisions

A. Definitions

1. "General process sources" means sources using a procedure or a combination of procedures for the purpose of causing a change in material by either chemical or physical means excluding combustion.

2. "Materials handling" means the handling, transporting, loading, unloading, storage, and transfer of material with no significant alteration of the chemical or physical properties of the material.

3. "Particulate matter" means small discrete masses of liquid or solid, exclusive of uncombined water.

4. "Sensitive area" means an area in which more stringent standards and compliance requirements apply to specified source categories than apply to such source categories outside a sensitive area.

B. General Air Contaminant Emission Standard

It shall be prohibited to cause or permit the emission of any air contaminant or water vapor from any source, including air contaminants not otherwise prohibited or limited by this regulation, if the air contaminant or water vapor causes detriment to the health, safety, or welfare of any person, or causes damage to business or property.

II. Visible Emission Standards

A. Maximum emission

1. Not to exceed 20% opacity for more than 3 minutes in any hour.

2. Exceptions:

a) When it can be shown emissions in excess of 20% will not occur for more than 15 minutes in any 8 consecutive hours.

II. Visible Emission Standards (Contd.)

b) When it can be shown that opacity exceeds the limitation of A.1. as the result of the presence of condensed water droplets and that the concentration of particulate matter is less than 0.10 gr/scf. For combustion emission the exhaust gas volume shall be corrected to 7% O_2.

III. Standards for Odorous Emissions

A. Recognized good practice and procedure shall be used to reduce any odors generated from any source which may unreasonably intefere with an adjoining property owner's use and enjoyment of his property.

IV. Standards for Fugitive Dust

A. Definitions

1. "Fugitive dust" means particulate material which is generated incidental to an operation, process or procedure and is emitted into the open air from points other than an opening designed for emissions such as a stack or vent.

B. Materials Handling

1. Reasonable precautions shall be taken to prevent release to the atmosphere of contaminants generated by materials handling.

2. Materials handling sources shall not be subject to the limitation of section II herein.

C. Reasonable precautions shall be taken to prevent fugitive dust from becoming airborne:

1) When handling, transporting, or storing particulate material;
2) When constructing, altering, repairing or demolishing a building, its appurtenances, or a road; and
3) From an untreated open area.

WASHINGTON: STANDARDS OF PERFORMANCE FOR STATIONARY SOURCES

V. Emission Standards for Particulate Matter

A. Definitions

1. "Combustion and incineration sources" means sources using combustion for waste disposal, steam production, chemical recovery or other process requirements and excludes open burning.

B. General

It shall be prohibited to cause or permit the emission of particulate matter from any source which becomes deposited beyond the property line of such source in sufficient quantities to interfere unreasonably with the use and enjoyment of the receiving property.

C. Standards for Combustion and Incineration Sources

1. Maximum emission (either type of facility)
   0.10 gr/dscf of exhaust gases

2. Incinerators (only)

   a) It shall be prohibited to cause or permit emissions in excess of 100 ppm of total carbonyls in the exhaust gases.
   b) Incinerators shall be operated only during daylight hours unless written permission to operate at other times is obtained from the Department.

3. Concentrations for combustion and incineration sources will be determined after the relevant volumes are corrected to 7% oxygen.

D. Standards for General Process Sources

1. Maximum emission
   0.10 gr/dscf of exhaust gas

VI. Emission Standards for Sulfur Dioxide (SO_2)

A. Maximum emission concentration
1000 ppm (by vol) in dry exhaust gases (correct exhaust gas volume to 7% O_2 for combustion emissions)

VI. Emission Standards for Sulfur Dioxide (SO_2) (Contd.)

B. Exception

1. When sufficient emission data is supplied and it can be demonstrated to the department that there is no feasible method of reducing the concentration to less than 1000 ppm and that the ambient air quality standard for sulfur dioxide will not be exceeded, the director may require the owner or operator to equip, operate, and maintain as many as three continuous ambient air monitoring stations at locations approved by and using equipment approved by the director in order to allow an exception to the standard in A. above.

VII. Standards for Hazardous Air Pollutants

A. The National Emission Standards for Hazardous Air Pollutants (40 CFR, Part 61) which currently cover asbestos, beryllium, beryllium rocket motor firing and mercury and are promulgated by the U.S. Environmental Protection Agency are adopted by reference. Of these incorporated standards, those for mercury emissions and beryllium emissions are relevant to this project.

VIII. Standards for New Stationary Sources

A. Most Federal regulations for new stationary emission sources (40 CFR, Part 60) are incorporated by reference with several minor procedural changes. The portions of such Federal regulations relevant to this project have been synopsized and this synopsis may be found under the "Federal EPA Regulations and Standards" part of this report.

B. The Federal emission source regulations incorporated by reference which are relevant or partially relevant to fossil-fuel conversion facilities and within the scope of this project cover the following listed plants or facilities:

VIII. Standards for New Stationary Sources

1. Incinerators (40 CFR, Part 60, Subpart E).

2. Storage Vessels for Petroleum Liquids (40 CFR, Part 60, Subpart K).

3. Petroleum Refineries (40 CFR, Part 60, Subpart J).

VIII. Standards for New Stationary Sources

C. The Federal standards for emissions from fossil-fuel fired steam generators (40 CFR, Part 60, Subpart D) are not incorporated herein because such facilities are covered by the Washington power plant siting statutes (chapter 80.50 RCW). Applicable particulate emission standards for these facilities are covered by section V. herein, however.

D. Where certain Federally restricted contaminents from any of the specific sources listed in subsection B. above are also covered in other sections of these regulations, the more stringent standard shall apply.

WASHINGTON SOLID WASTE STANDARDS

Basis: (1) Solid Waste Management Law, Chapter 70.95 RCW and Senate Bill No. 2038 passed March 1976 which pertains to hazardous waste.

(2) Regulation Relating to Minimum Functional Standards for Solid Waste Handling, Chapter 173-301, November 1972.

Agency: State Department of Ecology, Solid Waste Management Division.

Notes: (1) The functional standards are used as a guidance toward the required case-by-case review and approval of individual facilities by the Department.

(2) According to the Solid Waste Management Act, nothing shall prohibit a person from dumping or depositing solid waste resulting from his own activities onto or under the surface of the ground owned or leased by him when such action does not violate statutes or ordinances, or create a nuisance.

I. Regulation Relating to Miniminum Functional Standards for Solid Waste

A. Solid Waste Disposal Site

1. Approval is required prior to the establishment of a solid waste disposal site (however see note (2) above).

2. A disposal site shall be designed and constructed so as to:

   (a) Be esthetically compatible with the surrounding environment;'

   (b) Be enclosed by a fence;

   (c) Have buildings of sturdy construction;

   (d) Have the unloading area protected to prevent blowing material onto adjoining areas;

   (e) Have an adequate buffer zone around the area; and

   (f) Comply with local zoning and building codes.

WASHINGTON SOLID WASTE STANDARDS

I. Regulation Relating to Miniminum Functional Standards for Solid Waste (Contd.)

3. Adequate pollution control measures shall be provided as follows:

   (a) Surface water runoff from around the disposal site shall be intercepted and diverted around or under the site.

   (b) Surface runoff shall not cause a violation of receiving water standards.

   (c) Ground water pollution controls shall be provided as necessary.

   (d) Air pollution and dust controls shall be provided as needed.

   (e) Open burning is prohibited.

   (f) Noise controls shall be provided where necessary.

4. All weather roads shall be provided and maintained in good conditions.

B. Sanitary Landfill

1. Leachate Control

   Plans for a sanitary landfill shall include provisions for the interception and treatment of leachate at all sites where the average annual precipitation is 25 inches or more. A sampling and testing program for the leachate and its treated effluent may be required.

2. Pollution Prevention

   (a) The distance separating the bottom of a sanitary landfill disposing of readily decomposable organic waste and hazardous waste shall be determined on a case-by-case basis.

   (b) However, generally a separation equivalent to four (4) feet of imprevious soil shall be the minimum separation between the bottom of the fill and the highest ground water.

WASHINGTON SOLID WASTE STANDARDS

I. Regulation Relating to Miniminum Functional Standards for Solid Waste (Contd.)

3. Gas Venting

Provision shall be made for the adequate venting or redirecting of gases generated by solid waste, if conditions require.

C. Incinerator

Incinerators shall be designed in a manner to conform to the current edition of the Oregon-Washington incinerator committee standard.

II. Solid Waste Management Act

A. Substitute Senate Bill No. 2038 (became state law March 1976). An Act Relating to Hazardous Wastes

1. This Act gives the Department of Ecology the authority to adapt regulations designating hazardous wastes; and

2. Adopt and revise, when appropriate, minimum standards and regulations for the disposal of extremely hazardous wastes, to protect against hazards to the public, and to the environment.

3. No person shall dispose of designated extremely hazardous wastes at any disposal site in the state other than disposal sites established and approved for such purpose, except when such wastes are going to a processing facility which will result in the waste being reclaimed, treated, detoxified, neutralized, or otherwise processed to remove its harmful properties or characteristics.

WEST VIRGINIA WATER QUALITY CRITERIA

Basis: Administrative Regulations of the State of West Virginia for water quality criteria on Inter-and-Intrastate Streams, 1974.

Agency: Department of Natural Resources, Division of Water Resources.

Note: 1. A permit from the Division of Water Resources is required for the discharge of any pollutant or combination of pollutants into the waters of the state. Also, a permit is required to open, reopen, operate or abandon any mine, quarry or preparation plant whenever it might reasonably be expected that a discharge into or pollution of state waters may occur.

I. GENERAL WATER QUALITY CRITERIA

A. No sewage, industrial wastes or other wastes present in any waters of the state shall cause or materially contribute any of the following conditions:

1. Visible floating or settleable solids, suspended solids, foam, scum or oily sleeks of unreasonable kind or quality;

2. Objectionable deposits on the bottom;

3. Objectionable odors;

4. Objectionable odor and/or taste in domestic water supplies;

5. Substances which are toxic to humans, animals or aquatic life;

6. Objectionable color;

7. Objectionable bacterial concentrations; and

8. Requiring an unreasonable degree of treatment for production of potable water.

B. Non-Degradation

It is the intention of the Department of Natural Resources that waters whose existing quality is

WEST VIRGINIA WATER QUALITY CRITERIA

I. GENERAL WATER QUALITY CRITERIA (CONTD.)

better than the established standards not be lowered in quality without demonstrating such a change is justified.

II. GENERAL WATER USE CATEGORIES

A. Category A - Water Contact, Recreation

B. Category B1 - Public Water Supply

C. Category B2 - Industrial Water Supply

D. Category B3 - Agricultural Water Supply

E. Category C - Propagation of Fish

F. Category D - Water Transport, Cooling and Power

G. Category E. - Treated Wastes Transport and Assimilation

III. WATER USES AND WATER QUALITY CRITERIA

The regulations establish water quality criteria for specifically named streams and their tributaries. The following criteria are established for all of the above referenced water use categories, and are presented to represent the type limitations imposed, and may not be the same for all identified stream (which would be dependent on the intended water use).

A. Uses: A, B1, B2, B3, C, D and E.

B. Water Quality Criteria for The Above Water Uses:

Substance or Condition	Limitations
1. Dissolved Oxygen	≥5 mg/l
2. pH (range)	6.0 - 8.5
3. Temperature	≤5°F rise above ambient, not to exceed 87°F at any time during the months of May through November and not to exceed 73°F at any time during months of December through April.

WEST VIRGINIA WATER QUALITY CRITERIA

III. WATER USES AND WATER QUALITY CRITERIA (CONTD.)

4.	Threshold Odor	≤8 Theshold odor number at 40°C (daily average)
5.	Toxic Substances	≤1/10 of the 96-hour median tolerance limit.
6.	Bacteria (coliform)	≤1000/100 ml as monthly average; nor exceed this number in 20% of samples; nor exceed 2400/100 ml on any day.
7.	Fecal Coliform	≤200/100 ml as 30-day geometric mean based on not less than 5 samples; nor exceed 400/100 ml in more than 10% of any samples during any 30-day period.
8.	Radioactivity	. Gross Beta activity - 1000 picocuries per liter (pCi/l) . Dissolved strontium - 90 - 10 pCi/l . Dissolved Alpha Emitters - 3 pCi/l.

9. Heavy Metals

Constituent	Maximum Concentration in mg/l
Arsenic	0.01
Barium	0.50
Cadmium	0.01
Chromium (Hexavalent)	0.05
Lead	0.05
Silver	0.05

III. WATER USES AND WATER QUALITY CRITERIA (CONTD.)

10. Other Compounds

Constituent	Maximum Concentration in mg/l
Nitrates	45.0
Chlorides	100.0
Phenol	0.001
Cyanide	0.025
Fluoride	1.0
Selenium	0.01

In special cases more stringent standards, or exceptions to the above standards, may be established in individual cases.

IV. MIXING ZONES

A. The following water quality standards shall apply in mixing zones:

1. For cold and warm water fisheries and other inland waters the quality of the waters shall not:

   a. Be lethal to indigenous aquatic organisms.

   b. Contain chemical constituents or combinations of chemical constituents which exceed, at any time, 1/10 the 96-hour median tolerance limit for indigenous fish and their food organisms.

V. ACID MINE DRAINAGE CONTROL MEASURES

The State of West Virginia is a member of the Ohio River Vally Water Sanitation compact and has agreed to carry out established control measures.

A. The following measures have been adopted for the control of acid mine drainage in the state:

1. Surface and ground water shall be diverted where practicable to prevent entry or reduce the flow of waters into and through mine workings.

2. Water which gains entry to the workings shall be handled in a manner which will minimize the formation and discharge of acid mine drainage to streams.

V. ACID MINE DRAINAGE CONTROL MEASURES (CONTD.)

3. Refuse from the mining and processing of coal shall be handled and disposed of in a manner so as to minimize discharge of acid mine drainage therefrom to streams.

4. Discharge of acid mine drainage to streams shall be regulated insofar as practicable to equalize the flow of daily accumulation throughout a 24-hour period.

5. Upon appropriate circumstances, consideration shall be given to the treatment of acid mine drainage by chemical or other means to mitigate its pollution properties.

6. Upon discontinuance of the operation of any mine, the formation and discharge of acid mine drainage should be minimized.

WEST VIRGINIA: STANDARDS OF PERFORMANCE FOR STATIONARY SOURCES

Agency: West Virginia Air Pollution Control Commission

I. Emissions from Manufacturing Process Operations

A. Smoke/Visible Emissions

1. Emissions of smoke darker than No. 1 on the Ringelmann Smoke Chart or the equivalent percent opacity, except as noted in A.2, below, shall be prohibited.

2. The provisions of subsection A. shall not apply to smoke emissions of less than No. 2 on the Ringelmann Smoke Chart (or equivalent percent opacity) for any period or periods aggregating not over five minutes in any 60 minute period.

3. Emissions of smoke into the open air from any storage structure associated with any manufacturing process are prohibited.

B. Particulate Matter

1. Definitions

   a) "Process Weight Rate" shall mean a rate established as follows:
      (i) For continuous or long-run steady-state operations, it is the total process weight for the entire period of continuous operation or a typical portion thereof divided by the number of hours of such period or portion.
      (ii) For cyclical, batch operations or unit processes, it is the total process weight for a period that covers a complete operation or an integral number of cycles, divided by the hours of actual process operation during such period.

   b) "Duplicate Source Operation" shall mean any combination of two or more individual source operations of any size that have the same nomenclature, either formerly adopted and/or commonly sanctioned by usage (such as two or more rotary driers, electric arc furnaces, etc.), contained in the same plant.

   c) "Source Operation Type" shall mean a categorization defined as follows:
      (i) Type 'a' shall mean any manufacturing process source operation involving calcination, physical change or glass melting.
      (ii) Type 'b' shall mean any manufacturing process source operation in which materials of any origin undergo a chemical change, unless otherwise classified.

I. Emissions from Manufacturing Process Operations (Contd.)

2. Emission Standards

The emission rate of particulate matter from any type source operation or duplicate source operation, or from any air pollution control equipment installed on any type source operation shall not be in excess of the following:

Operating Source Operation or Total Duplicate Source Operation Process Weight Rate in Pounds Per Hour[1]	Maximum allowable Total Stack Emission Rate in Pounds Per Hour For the Appropriate Process Weight and Source Operation Type[1]	
	Type 'a'	Type 'b'[2]
0	0	0
5,000	5	0.8
20,000	16	4.0
50,000	31	10.5
100,000	33	21.2
300,000	40	21.2
500,000	47	21.2
800,000	50	21.2
1,800,000 and above	50	21.2

[1] For a process weight between any two consecutive process weights stated in this table, the emission limitation shall be determined by linear interpolation.

[2] Type 'b' source operation stack emission rates do not apply to MINERAL ACIDS. See subsection C.1.

C. Mineral Acids

1. The stack gas concentration from any stationary source operation for the below designated mineral acids shall not be in excess of the quantities in the table below.

Mineral acids shall not be released from any type source operation or duplicate source operation or from all air

I. Emissions from Manufacturing Process Operations (Contd.)

pollution control equipment installed on any type source operation or duplicate source operation in excess of the quantity given in the following table:

Mineral Acid	Allowable Stack Gas Concentration in Milligrams Per Dry Cubic Meter at Standard Conditions
Sulfuric Acid Mist	35
Nitric Acid Mist and/or Vapor	70
Hydrochloric Acid Mist and/or Vapor	210

II. Emissions from Fuel Burning Equipment

A. Definitions

1. "Fuel Burning Unit" means any furnace, boiler apparatus, device, mechanism, stack, or structure used in the process of burning fuel or other combustible material for the primary purpose of producing heat or power by indirect heat transfer. For the purposes of this regulation all fuel burning units are classified in the following categories:

   a) Type 'a' shall mean any fuel burning unit which has as its primary purpose the generation of steam or other vapor to produce electric power for sale.
   b) Type 'b' shall mean any fuel burning unit not classified as a Type 'a' or Type 'c' unit, such as industrial pulverized-fuel-fired furnaces, cyclone furnaces, gas-fired and liquid-fuel-fired units.
   c) Type 'c' shall mean any hand-fired or stoker-fired fuel burning unit not classified as a Type 'a' unit.

2. "Similar Unit(s)" means all Type 'a', or all Type 'b', or all Type 'c' fuel burning units located at one plant.

3. "Fuel" means any form of combustible matter (solid, liquid, vapor, or gas) that is used as a source of heat.

4. "Particulate Matter" means any material, except uncombined water, that exists in a finely divided form as a liquid or solid.

II. Emissions from Fuel Burning Equipment (Contd.)

B. Smoke/Visible Emissions

1. Standards for fuel burning units not meeting the requirements of subsection II.C. (particulate matter standards) below.

    a) Emission of smoke into the open atmosphere darker than No. 0.5 on the Ringelmann Smoke Chart (10 percent opacity) shall be prohibited.
    b) The provisions of B.1.a) above shall not apply to smoke emitted during cleaning of a fire box or soot blowing, the shade of which smoke emissions is less than No. 2 Ringelmann, for a period or periods aggregating no more than eight minutes per fuel burning unit in any eight hour period.

2. Standards for fuel burning units meeting the requirements of subsection II.C of this regulation.

    a) Emissions of smoke into the open atmosphere darker than No. 0.5 Ringelmann (10 percent opacity) shall be prohibited.
    b) The provisions of B.2. a) above shall not apply to smoke emitted during cleaning of a fire box or soot blowing the shade of which smoke emissions is less than No. 1 Ringelmann (20 percent opacity) for a period or periods aggregating no more than 8 minutes per fuel burning unit in any eight hour period.

3. Startup exemptions. Upon written application to the Commission, exemptions above the standards listed above in this subsection B. may be granted as to the fire startup period in these units. However, in no case shall the exemptions granted exceed the following limitations:

Type of Fuel	Exemptions Allowed for No More Than Two Hours Per Startup Operation Shall Not be as Dark or Darker in Shade or Appearance as:
Type 'a' and Type 'b'	No. 2 Ringelmann
Type 'c'	(1) For forty-five minutes No. 3 Ringelmann (2) For the remaining seventy-five minutes No. 2 Ringelmann

II. Emissions from Fuel Burning Equipment (Contd.)

C. Particulate Matter Emissions

1. Affected Facilities. The provisions of subpart C. shall not apply to fuel burning units having a heat input under ten (10) million Btu's per hour. However, failure to attain acceptable air quality in parts of some urban areas may require mandatory control of these exempt sources later.

2. Standard Emissions of particulate matter into the open atmosphere from all fuel burning units located at one plant shall be prohibited in excess of the amount (in lbs per hour) determined as follows:

a) For Type 'a' fuel burning units, the product of 0.05 and the total design heat inputs for such units in million British Thermal Units (Btu's) per hour, provided however that no more than 1200 pounds per hour of particulate matter shall be discharged into the open air from all such units;
b) For Type 'b' fuel burning units, the product of 0.09 and the total design heat inputs for such units in million Btu's per hour, provided however that no more than 600 pounds per hour of particulate matter shall be discharged into the open air from all such units; and,
c) For Type 'c' fuel burning units, in excess of the values listed in the following table, provided however that no more than 300 pounds per hour of particulate matter shall be discharged into the open air from all such units:

Total Design Heat Input for All Type 'c' Fuel Burning Units Located at One Plant in Millions of Btu's Per Hour*	Total Allowable Particulate Matter Emission Rate for All Type 'c' Fuel Burning Units Located at One Plant in Pounds Per Hour
10	3.4
40	9.0
100	16.6
400	42.2
3,333	300.0

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*Linear interpolation is to be used to determine values between any two consecutive values listed in this table.

II. Emissions from Fuel Burning Equipment (Contd.)

D. Fugitive Particulate Matter Emissions

1. Affected Facilities. The provisions of this subsection D shall not apply to fuel burning units having a heat input under ten million Btu's per hour.

2. Definitions. "Fugitive Particulate Matter Control System" means any equipment or method used to confine, collect, or dispose of fugitive particulate matter, including, but not limited to, hoods, bins, duct work, fans, and air pollution control equipment.

3. Operating any source of fugitive particulate matter without it being equipped with a fugitive particulate matter control system is prohibited. Any such control system used shall be operated and maintained in a manner so as to minimize emission of fugitive particulate matter. Fugitive particulate sources associated with fuel burning units include but are not limited to the following:

   a) Stockpiling of ash or fuel in the open or in enclosures such as silos;
   b) Transport of ash in vehicles or on conveying systems, to include spillage, tracking, or blowing of particulate matter from or by such vehicles or equipment; and
   c) Ash or fuel handling systems and ash disposal areas.

E. Sulfur Oxides Addition to Exit Gas Stream of Combustion Unit

1. The addition of sulfur oxides to a combustion unit exit gas stream for the purpose of improving control equipment efficiency is prohibited.

WEST VIRGINIA: STANDARDS OF PERFORMANCE FOR STATIONARY SOURCES

F. Sulfur Dioxide Weight Emission Standards for Fuel Burning Units

Section 3.01. Total Allowable Emission Rates for Similar Units in "Priority I Regions", "Priority II Regions", and "Priority III Regions" as defined below:

Priority Classification	Federal Air Quality Control Region	Included West Virginia Counties
I	Region I, Steubenville-Weirton-Wheeling Interstate Air Quality Control Region (Ohio - West Virginia)	Brooke Hancock Marshall Ohio
	Region VII, Cumberland-Keyser Interstate Air Quality Control Region (West Virginia - Maryland)	Grant (Union District only) Mineral (Elk, New Creek, and Piedmont Districts)
II	Region II, Parkersburg-Marietta Interstate Air Quality Control Region (West Virginia - Ohio)	Jackson Pleasants Tyler Wetzel Wood
III	All other regions	All other counties or districts not listed above

No person shall cause, suffer, allow, or permit the discharge of sulfur dioxide into the open air from all stacks located at one plant, measured in terms of pounds per hour, in excess of the amount determined as follows:

1. For fuel burning units of the Kammer Plant of Ohio Power Company, located in Air Quality Control Region I, the product of 6.8 and the total design heat inputs for such units discharging through those stacks in million British Thermal Units (Btu's) per hour.
2. For fuel burning units of the Mitchell Plant of Ohio Power Company, located in Air Quality Control Region I, the product of 7.5 and the total actual operating heat inputs for such units discharging through those stacks in million Btu's per hour.

3. For fuel burning units of the Willow Island Station of Monongahala Power Company, located in Air Quality Control Region II, the product of 2.7 and the total design heat inputs for such units discharging from those stacks in million Btu's per hour.

4. For fuel burning units of the Mt. Storm Plant of Virginia Electric and Power Company, located in Air Quality Control Region VII, the product of 2.7 and the total design heat inputs for such units discharging through those stacks in million Btu's per hour.

5. For Type 'b' and Type 'c' fuel burning units, the product of 3.1 and the total design heat inputs for such units discharging through those stacks in million Btu's per hour.

Section 3.02. Maximum Allowable Emission Rates for Similar Units in Region IV (Kanawha Valley Air Quality Control Region: Kanawha County, Putnam County, and Falls and Kanawha Magisterial Districts of Fayette County).

No person shall cause, suffer, allow, or permit the discharge of sulfur dioxide into the open air from all stacks located at one plant, measured in terms of pounds per hour, in excess of the amount determined as follows:

1. For fuel burning units of the John Amos Plant of Appalachian Power Company, located in Air Quality Control Region IV, the product of 1.6 and the total design heat inputs from such units discharging from those stacks in million Btu's per hour.

2. For fuel burning units of the Kanawha River Plant of Appalachian Power Company, located in Air Quality Control Region IV, the product of 1.6 and the total design heat inputs from such units discharging through those stacks in million Btu's per hour.

3. For Type 'b' and Type 'c' fuel burning units, the product of 1.6 and the total design heat inputs for such units discharging through those stacks in million Btu's per hour, provided however, that no more than 5,500 pounds per hour of sulfur dioxide shall be discharged into the open air from all such stacks.

Section 3.03. Maximum Allowable Emission Rates for Similar Units in All Priority III Regions Except Region IV.

No person shall cause, suffer, allow, or permit the discharge of sulfur dioxide into the open air from all stacks located at one plant, measured in terms of pounds per hour, in excess of the amount determined as follows:

1. For fuel burning units of the Harrison Power Station of Monongahela Power Company, located in Air Quality Control Region VI, the product of 5.12 and the total actual operating heat inputs for such units discharging from those stacks in million Btu's per hour.

2. For fuel burning units of the Rivesville Power Station of Monongahela Power Company, located in Air Quality Control Region VI, the product of 3.2 and the total design heat inputs for such units discharging from those stacks in million Btu's per hour.

3. For fuel burning units of the Albright Power Station of Monongahela Power Company, located in Air Quality Control Region VI, the product of 3.2 and the total design heat inputs for such units discharging from those stacks in million Btu's per hour.

4. For fuel burning units of the Fort Martin Power Station of Monongahela Power Company, located in Air Quality Control Region VI, the product of 3.1 and the total actual operating heat inputs for such units discharging from those stacks in million Btu's per hour.

5. For fuel burning units of the Philip Sporn Plant of Central Operating Company, located in Air Quality Control Region III, the product of 3.2 and the total design heat inputs for such units discharging from those stacks in million Btu's per hour.

6. For Type 'b' and Type 'c' fuel burning units, the product of 3.2 and the total design heat inputs for such units discharging through those stacks in million Btu's per hour.

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Section 3.04. Allowable Emission Rates for Individual Stacks

The maximum allowable emission rate for an individual stack shall not exceed by more than 25 percent the emission rate determined by prorating the total allowable emission rate specified in Sub-Sections 3.01, 3.02, or 3.03 on the basis of individual unit heat input at design capacity for all fuel burning units discharging through that stack.

Subject to the provisions of this regulation, allowable emission rates for individual stacks shall be determined by the owner and/or operator and registered with the Commission at the request of and on forms provided by the Director. Such rates shall be subject to review and approval by the Director.

The approved set of individual stack allowable emission rates shall become an official part of the compliance schedule and any permits concerning such sources, and shall not be changed without the prior written approval of the Director.

Section 3.05. The design heat input of a waste heat boiler shall not be included in computing the total plant design heat input for the purposes of Sub-Sections 3.01, 3.02, 3.03, or 3.04 of this regulation.

Section 3.06. No person shall circumvent the provisions of this regulation by constructing fuel burning unit(s) larger than would be necessary to provide heat and/or power for an existing manufacturing plant, with a reasonable margin for plant expansion, in order to use that design heat input to raise the allowable sulfur content in fuel.

Section 3.07. No person shall cause, suffer, allow, or permit the discharge of sulfur dioxide to the open air from the combustion of fuel in a fuel burning unit of a waste heat boiler in excess of 2.2 pounds of sulfur dioxide per million Btu's of heat input per hour. This limitation is based on the heat input provided to the boiler by the combustion of this auxiliary fuel.

The provision of this Sub-Section applies only to the fuel used for the waste heat boiler(s) and does not replace or supersede the provisions of Sub-Section 3.08.

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Section 3.08. Weight Emission Standards for Manufacturing Process Source Operations

1. No person shall cause, suffer, allow, or permit the emission into the open air from any source operation an in-stack sulfur dioxide concentration exceeding 2,000 parts per million by volume from existing source operations, except as provided in Sub-Sections 2., 3., 4., 5., and 6., following.

2. No person shall cause, suffer, allow, or permit sulfur dioxide tail gas emissions from sulfuric acid manufacturing plants to exceed the following:

   a) For plants using elemental sulfur as a feed stock, 30 pounds per ton of acid produced.
   b) For plants using other materials as feed stock, 40 pounds per ton of acid produced.

3. No person shall cause, suffer, allow, or permit the emission of sulfur oxides, calculated as sulfur dioxide, from a sulfur recovery plant to exceed 0.06 pounds per pound of sulfur processed.

4. No person shall cause, suffer, allow, or permit the combustion of any refinery process gas stream or any other process gas stream that contains hydrogen sulfide in a concentration greater than 50 grains per 100 cubic feet of gas. In certain cases very small units may be considered exempt from this requirement if, in the opinion of the Commission, compliance would be economically unreasonable and if the contribution of the unit to the surrounding air quality could be considered negligible.

5. No person shall cause, suffer, allow, or permit the emission of sulfur oxides, calculated as sulfur dioxide, from primary non-ferrous smelters to exceed that determined by the following equations:

   Copper Smelters: $Y = 0.2X$

   Zinc Smelters: $Y = 0.564X^{0.85}$

   Lead Smelters: $Y = 0.98X^{0.77}$

   Where X is the total sulfur fed to the smelter in pounds per hour, and Y is the allowable sulfur dioxide emissions in pounds per hour.

6. No person shall cause, suffer, allow, or permit the total sulfite pulp mill emissions of sulfur oxides, calculated as sulfur dioxide, from operations such as blow pits, washer vents, storage tanks, digester relief, and recovery system, to exceed 9.0 pounds per air-dried ton of pulp produced.

Section 4. Registration

1. Within thirty (30) days after the effective date of this regulation all persons owning and/or operating a source(s) of sulfur dioxide subject to this regulation and not previously registered shall have registered such source(s) with the Commission. The information required for registration shall be determined and provided in the manner specified by the Director. Registration forms should be requested from the Director by the owner and/or operator of such source(s).

2. The owner and/or operator of a source(s) of sulfur dioxide that is under construction or on which construction is initiated within thirty (3) days after the effective date of this regulation shall register such source(s) within this thirty (30) day period.

III. Emissions from Coal Preparation Plants and Coal Handling Operations

A. Definitions

1. "Coal Preparation" includes, but is not limited to, drying or air separation operations used for the purpose of preparing the product coal for marketing.

2. "Handling Operation" includes, but is not limited to, all coal grinding, crushing, picking, screening, conveying, storing, and stockpiling operations associated with the transport, production, or preparation of coal or coal refuse, excluding coal washing, drying, or air separation operations.

III. Emissions from Coal Preparation Plants and Coal Handling Operations (Contd.)

B. Smoke/Visible Emissions

1. Emissions of smoke into the open atmosphere as dark or darker than No. 1 on the Ringelmann Smoke Chart shall be prohibited.

2. The provisions of subsection B.1. above shall not apply to:

   a) smoke emissions of less than No. 3 Ringelmann for periods aggregating no more than 5 minutes in any 60-minute period of operation, or,
   b) smoke emissions of less than No. 3 Ringelmann for a period of up to 8 minutes in any operating day for purposes of building a fire of operating quality in the fuel burning equipment of a thermal drier.

3. Smoke/Fugitive dust. Emissions of smoke from any fugitive dust control system as dark or darker than No. 1 on the Ringelmann Chart (or equivalent percent opacity shall be prohibited.

C. Particulate Emissions from Coal Thermal Drying Operations

1. Emissions limitations. Emissions of particulate matter to the open atmosphere from a thermal drier shall not exceed values shown in the following table*:

Total Plant Volumetric Flow Rate** (Standard Cubic Feet Per Minute)	Maximum Allowable Particulate Loading Per Drier (Grains Per Standard Cubic Foot)
75,000 or less	0.10
111,000	0.09
163,000	0.08
240,000 & above	0.07

*Use linear interpolation to determine particulate loadings between Plant Flow Rates shown on this table.
**The total plant volumetric flow rate shall be the total standard cubic feet of dry gas passed through all thermal driers at one plant location.

III. Emissions from Coal Preparation Plants and Coal Handling Operations (Contd.)

2. Modifications. The limitations of C 1. above shall apply to modifications resulting in significant increases in total gas volume even though no new thermal drier(s) is installed. The as-modified plant volumetric flow rate shall be used to determine the new particulate limitations.

3. Stacks

a) Exhaust gases from any thermal drier shall not be vented into the open air at an altitude of less than 80 feet above the foundation grade of the structure containing the drier or less than 10 feet above the top of the drier structure or any adjacent structure, whichever is greater.
b) In determining the desirable stack height, due consideration shall be given to local topography, meteorology, location of nearby dwellings and public roads and stack emission rate.
c) Said stacks shall contain flow straightening devices or a vertical run of sufficient length to establish flow patterns acceptable for good stack sampling procedures.

D. Particulate Emissions from Air Table Operations

1. Emissions limitations. Emissions of particulate matter to the open atmosphere in air table exhaust gases shall not exceed 0.05 grains per standard cubic foot of exhaust gases.

2. Stacks. Any stack venting air table exhaust gases to the open atmosphere shall contain flow straightening devices or a vertical run of sufficient length to establish flow patterns acceptable for good stack sampling procedures.

E. Fugitive Dust Emissions

1. Definitions. "Fugitive Dust Control System" means any equipment or method used to confine, collect, and dispose of fugitive dust including but not limited to, hoods, bins, duct work, fans, and air pollution control equipment.

III. Emissions from Coal Preparation Plants and Coal Handling Operations (Contd.)

2. Any coal handling operation or preparation plant shall not be conducted or operated without being equipped with a fugitive dust control system; good operating practices shall be observed in relation to stockpiling, car loading, breaking, screening and general maintenance to minimize dust generation and emissions. Paving or other suitable measures shall be used on the premises and on owned or controlled access roads to maintain dust control.

IV. Prevention and Control of Objectionable Odors

A. Definitions

1. "Objectionable Odor" means odors generally recognized as being objectionable and also odors deemed objectionable by a duly authorized representative of the Commission based upon his investigations (whether based on complaints or at his own instigation).

B. General Prohibition

1. The discharge of air pollutants which cause or contribute to an objectionable odor at any location occupied by the public is prohibited.

2. Measuring devices or techniques. The Barnebey-Cheney Scentometer or any other instrument, device, or technique designated by the Commission may be used as an enforcement guide and in the determination of the objectionability of an odor.

C. Variances and Exemptions

1. Variances. A program to control objectionable odors may be developed and offered to the Commission by responsible parties in the prescribed manner and within the time allowed. A variance shall be issued upon approval of the program by the Commission; thereafter, observance of the approved program will prevent citation for violation of this regulation. Variances relating to specific emergency conditions and time periods may also be granted upon proper application for expected emergency discharges which would otherwise result in violations.

IV. Prevention and Control of Objectionable Odors (Contd.)

2. Exemptions: This regulation shall not apply to the following sources of objectionable odor until feasible control methods are developed:

a) Internal combustion engines.

WEST VIRGINIA SOLID WASTE DISPOSAL REGULATIONS

Basis: West Virginia State Board of Health, Chapter 1, Article 12, Solid Waste Disposal Regulations (July 1974), and Design Standards for Solid Waste Disposal, Bulletin SWP-D1.

Agency: State Department of Health

Note: (1) A permit is required prior to any person constructing or operating a solid waste disposal facility.

I. Solid Waste Disposal Class Rating

A. Class I - wastes of a hazardous nature or water soluble substances having toxic or infectious properties or special water pollution potential which must be kept away from usable water sources regardless of costs.

B. Class II - Decomposable organic materials.

C. Class III - Inert and relatively nondecomposable material presenting only confinement and esthetic problems.

II. Class I Disposal Facilities

A. Requirements

The requirements for Class I waste disposal shall be determined separately for each application.

III. Class II Disposal Facilities

A. Requirements

1. Sites shall be acceptable geologically and hydrologically for soil stability, adaptibility and ground and surface water protection.
2. Surface and ground water shall be prevented from contacting deposited waste.
3. Facilities shall be situated to conform with long range regional requirements.

B. Design

1. The plans shall specify a method of leachate control and treatment.

III. Class II Disposal Facilities (Contd.)

2. A set of plans and specifications must be maintained at the site for operator instructions and for recording progress and deviations.

3. The Director may require core borings, elevation of water table, soil and bedrock characteristics, and other pertinent data before granting a permit.

C. Operation

The operational requirements do not provide any criteria applicable to the design of a disposal facility; therefore, they are not presented for this state. However, the operational requirements are the same as presented for other states.

IV. Class III Land Disposal and Other Methods

A. The requirements of III above shall apply to Class IV disposal facilities with respect to protection of water sources.

B. Plans and specifications for incinerators shall be prepared by a registered engineer and shall be approved by the Director prior to construction and operation.

V. Design Standards for Solid Waste Disposal (Bulletin SWP-D1)

This publication was prepared by the Environmental Health Services in connection with the Solid Waste program to guide designers, managers, operators and others in the installation and operation of Class II solid waste landfill disposal facilities.

WYOMING WATER QUALITY STANDARDS

Basis: Wyoming Water Quality Rules and Regulations, 1974

Agency: Wyoming Department of Environmental Quality

Note: (1). Wyoming has received authority from the Environmental Protection Agency to issue and enforce NPDES permits.

(2) Waters of the state whose existing quality is better than the established standards on the date any such standard becomes effective will be maintained; provided that the state has the power to authorize any project which would constitute a new or increase source of pollution; provided further, the necessary degree of waste treatment to maintain the high quality will be required where physically and economically feasible.

I. WATER QUALITY STANDARDS

A. Water Classes and Uses

1. Class I - Waters which are determined to be presently supporting game fish or has the potential to support game fish.
2. Class II - Waters which are determined to be presently supporting non-game fish or has the potential to support non-game fish.
3. Class III - Waters not having the potential to support fish.
4. Priority for classification will be given to those waters which receive pollutants. A water must be classified before any permit to discharge to that water is issued.

B. Control Points

1. Bacteriological standards apply to the classes of waters, and will be determined at water supply intakes and designated full body contact recreation areas. Bacteriological standards covering secondary body contact may be determined at any point on the stream.
2. Parameters which are toxic or generally affect aquatic life, wildlife, etc. will be determined at any point in the streams as indicated by conditions.

WYOMING WATER QUALITY STANDARDS

I. WATER QUALITY STANDARDS (CONTD.)

3. Compliance with water quality standards shall be determined after allowing reasonable time for mixing. The Department will determine the area and/or volume of the receiving water assigned to the mixing zone.

C. Application

The following water quality standards apply to Wyoming waters:

1. Settleable Solids - All waters shall be essentially free from substances that will settle to form sludge, bank or bottom deposits.

2. Floating Solids - All waters shall be essentially free from floating debris, scum and other floating materials in amounts sufficient to be unsightly.

3. Taste, Odor and Color - All Class I and II waters shall be essentially free from substances which produce taste, odor and color that would impart an unpalatable flavor in fish; visibly alter the natural color of water; produce detectable odor at the site of use, and result in concentrations that will produce undesirable taste or odor to the finished water.

4. Public Water - When public water supply is a designated use, the quality will be such that after conventional treatment the water will meet the most recent Federal Drinking Water Standards, published by the U.S. Public Health Service or EPA.

5. Toxic Material - All waters shall be essentially free from toxic, corrosive or other deleterious substances in concentrations or combinations which are toxic to human, animal, plant or aquatic life.

WYOMING WATER QUALITY STANDARDS

I. WATER QUALITY STANDARDS (CONTD.)

6. Radioactivity - In all waters, radioactive material of other than natural origin shall not exceed a concentration of:

Radium 226 - 3 pCi/l
Strontuim (90) - 10 pCi/l

or the limits established by U.S. Public Health Service or EPA.

7. Turbidity - In all Class I and II waters, wastes shall not cause the turbidity to be increased by more than 10 Jackson Turbidity Units. (JTU)

8. Dissolved Oxygen - In Class I waters 6 mg/l
In Class II waters 5 mg/l

9. Temperature - For streams where natural temperatures do not exceed 68°F, wastes of other than natural origin shall not be discharged in amounts which will result in a change of more than 2°F over existing temperatures.

For streams where natural temperatures exceed 68°F wastes of other than natural origin shall not be discharged in amounts which will result in a change of more than 4°F over existing temperatures in warm water fisheries; 2°F in cold water fisheries and 2°F in impoundments.

The maximum allowable stream temperatures will be the maximum daily stream temperatures plus the allowable rise; provided that this temperature is not over 78°F in cold water fisheries and 90°F in warm water fisheries.

The temperature standards shall apply at all depths of the receiving water.

WYOMING WATER QUALITY STANDARDS

I. WATER QUALITY STANDARDS (CONTD.)

10. pH - For all waters, wastes other than natural origin shall not cause the pH to be less than 6.5 or greater than 8.5.

11. Coliform Bacteria (Appliciable to still water bodies at an altitude of less than 7,000 feet above sea level) - (May 1 through September 30) wastes of other than natural origin shall not be discharged in amounts which will cause fecal coliform concentrations to exceed a geometric mean of 200/100 ml based on not less than 5 samples during separate 24 hour periods for any 30 day period, nor shall 10% of the samples exceed 400/100 ml during any 30 day period.

12. Coliform Bacteria (for all other waters not specically named) - (May 1 through September 30) fecal coliform concentrations shall not exceed a geometric mean of 1000/100 ml, based on not less than 5 samples during separate 24 hour periods for any 30 day period, nor shall 10% of the samples exceed 2000/100 ml during any 30 day period.

13. Oil and Grease - In all waters, wastes of other than natural origin shall not be discharged which will cause the oil and grease content to exceed 10 mg/l; formation of a visible oil film, discoloration of the surface, or formation of visible deposits on the bottom or shoreline.

14. Total Gas Pressure - Total gas pressure shall not exceed 110% of existing atmospheric pressure. (applicable to waters designated as cold water aquatic life).

II. OIL AND HAZARDOUS MATERIALS (Chapter V)

A. Approval Required for Disposal of Oil or Hazardous Materials.

Spilled oil or hazardous materials or contaminated materials resulting from control, treatment and cleanup shall be handled and disposed of as approved by the Director.

WYOMING: STANDARDS OF PERFORMANCE FOR STATIONARY SOURCES

Agency: Air Quality, Division, Wyoming Department of
Environmental Quality

I. General Provisions

A. Definitions

1. "Air contaminant" means dust, fumes, mist, smoke, other particulate matter, vapor, gas or any combination of the foregoing, but shall not include steam or water vapor.

2. "Fuel burning equipment" means any furnace, boiler apparatus, stack, or appurtenances thereto used in the process of burning fuel or other combustible material for the purpose of producing heat or power by indirect heat transfer.

3. "Incinerator" means any equipment, device or contrivance used for the destruction of garbage, rubbish or other wastes by burning, but not wood wastes burned in devices commonly called teepee burners, silos, truncated cones, wigwam burners and other such burners used commonly by the wood products industry.

4. "Odor" means that property of an emission which stimulates the sense of smell.

5. "Particulate matter" means any material, except water in uncombined form, that is or has been airborne and exists as a liquid or a solid at standard conditions.

B. Diluting and Concealing Emissions

1. The installation or use of any device, contrivance or operational schedule which, without resulting in reduction of the total amount of air contaminant released to the atmosphere, shall dilute or conceal an emission from a source is prohibited.

2. Exception. Subsection B.1. above shall not apply to the control of odors.

II. Visible Emission Standards

A. General

1. Maximum emissions
   20% opacity

II. Visible Emission Standards (Contd.)

Exception: Not to exceed 40% opacity for a period or periods aggregating not more than six minutes in any hour.

2. Visible emissions from gasoline engines shall be eliminated except for periods not exceeding five consecutive seconds.

3. The emission of visible air pollutants from diesel engines shall be limited to 30 percent opacity below 7500 feet elevation except for periods not exceeding ten consecutive seconds. This limitation shall not apply during a reasonable period of warmup following a cold start or where undergoing repairs following a malfunction.

B. Fuel Burning Equipment

1. Maximum emissions
20% opacity

Exception: Not to exceed 40% opacity for more than seven minutes in any hour.

C. Incinerators

1. Maximum emissions
20% opacity

D. Exception

Where the presence of uncombined water is the only reason for failure of an emission to meet the opacity requirements of section II of this regulation, such opacity requirements shall not apply.

III. Emission Standards for Particulate Matter

A. Affected facilities: Any source except those covered in subsections III.D. and III.E. herein.

B. Definitions

1. Process weight per hour means the total weight of all materials introduced into any specific process that may cause any emissions of particulate matter, including solid fuels, but excluding liquids or gases used solely as fuels, excluding air introduced for purposes of combustion, and excluding the weight of any water, water vapor or steam that may be introduced as part of the total materials.

III. Emission Standards for Particulate Matter (Contd.)

a) For a cyclical or batch operation the process weight per hour is derived by dividing the total process weight by the number of hours in one complete operation from the beginning of any given process cycle to the completion thereof, excluding any time during which the equipment is idle.

b) For a continuous operation the process weight per hour is derived by dividing the process weight for a typical period of time.

C. Standards - General

Maximum Emissions

for process weight rates $\leq$60,000 lb/hr use:

$$E = 3.59P^{0.62}$$

for process weights rates >60,000 lb/hr use:

$$E = 17.31P^{0.16}$$

where (in both cases): E is the maximum emissions in lb/hr and P is the process weight rate in ton/hr.

D. Standards for Fuel Burning Equipment

1. Affected Facilities. Installations in which fuel is burned for the primary purpose of producing steam, hot water, or hot air or other indirect heating of liquids, gases, or solids, and, in the course of doing so, the products of combustion do not come into direct contact with process materials. When any products or byproducts of a manufacturing process are burned for the same purpose or in conjunction with any fuel, the same emission limitations shall apply.

2. Definitions

a) "Heat input" for purposes of subsection D. herein means the aggregate heat content of all fuels whose products of combustion pass through a stack or stacks. The heat input value used shall be the equipment manufacturer's or designer's guaranteed maximum input, whichever is greater. The total heat input of all fuel burning units at a plant shall be used for determining the maximum allowable amount of particulate matter which may be emitted.

III. Emission Standards for Particulate Matter (Contd.)

3. Standards

Maximum emission
0.10 lb/MM Btu heat input, 2 hr average

E. Standards for Incinerators

1. Maximum emission
0.20 lbs/100 lbs of refuse charged

IV. Emission Standards for Fugitive Dust

A. General

The emission of fugitive dust shall be limited by all persons handling, transporting, or storing any material to prevent unnecessary amounts of particulate matter from becoming airborne to the extent that ambient air standards described in these regulations are exceeded. Control measures described as follows or any equivalent method shall be considered appropriate for such control:

1. Use, where possible, of water or chemicals for control of dust in the demolition of existing buildings, or structures, construction operations, the grading of roads or the clearing of land;

2. Application of asphalt, oil, water, or suitable chemicals on dirt roads, materials stockpiles, and other surfaces which can give rise to airborne dusts;

3. Installation and use of hoods, fans and fabric filters to enclose and vent the handling of dusty materials; adequate containment methods shall be employed during sandblasting or other similar operations;

4. Covering at all times when in motion, materials being transported likely to give rise to airborne dust;

5. The paving of roadways and their maintenance in a clear condition;

6. The prompt removal of earth or other material from paved streets onto which earth or other material has been transported by trucking or earth moving equipment, erosion by water, or other means.

V. Emission Standards for Odors

A. Affected facilities: Any source emitting odors.

B. Standards

1. Odor emissions shall be limited so that no odor is detectable from a sample taken at the property line of the emitting source after dilution with up to seven volumes of odor free air as determined by the Barneby-Cheney Co. scentometer or other Division approved equivalent method.

2. Effective odor control devices, systems or measures shall be installed and operated such that no vent, exhaust pipe, blowoff pipe, or opening of any kind shall discharge into the outdoor air any odorous matter, vapors, gases, or dusts, or any combination thereof, which create odors in areas adjacent to the plant in excess of the limits described in subsection B.1.

3. Odor producing materials shall be stored, transported, and handled in a manner so that odors produced from such materials are confined and that accumulation of such materials resulting from spillage or other escape is prevented.

VI. Emission Standards for Carbon Monoxide (CO)

A. Standards for Stack Gases from Stationary Sources

1. Carbon monoxide emission shall be limited as may be necessary to prevent Wyoming ambient standards for CO from being exceeded.

2. Measures considered appropriate for such control as required by A.1. are:

a) Treatment of the waste gas stream by installation and use of a direct flame afterburner or other Division approved means of equal effectiveness.

VII. Emission Standards for Sulfur Compounds

A. Emission Standards for Hydrogen Sulfide (H_2S)

1. Any process exit gas stream containing H_2S emitted from any source shall be vented, incinerated, flared or otherwise disposed of in such a manner that ambient SO_2 and H_2S standards are not exceeded.

VII. Emission Standards for Sulfur Compounds (Contd.)

B. Emission Standards for Sulfur Oxides (SO_x)

1. Definitions

a) For purposes of this subsection B the "heat input" shall be the aggregate heat content of all fuels whose products of combustion pass through a stack or stacks or the equipment manufacturer's or designer's guaranteed maximum input, whichever is greater.

2. Fuel Burning Equipment

a) Affected facilities: Individual units with a heat input value $\geq$250 MM Btu/hr.

b) Maximum SO_2 Emission

coal-fired facilities: 0.2 lb/MM Btu heat input, maximum 2 hr average

oil-fired facilities: 0.8 lb/MM Btu heat input, maximum 2 hr average

3. Sulfuric Acid (H_2SO_4) Producing Facilities

a) Processes producing sulfuric acid (H_2SO_4) by the contact method burning elemental sulfur, alkylation acid, hydrogen sulfide, organic sulfides, mercaptans, or acid sludge shall limit emissions of SO_2 in all effluent streams to not more than 4 lb/T of acid produced, maximum 2 hr average.

VIII. Emission Standards for Nitrogen Oxides (NO_x)

A. Fuel Burning Equipment

1. Maximum emissions
(lbs NO_x calculated as NO_2)

gas-fired: 0.20 lb/MM Btu of heat input

oil-fired: $\geq$1MM Btu heat input - 0.30 lb/MM Btu of heat input
<1MM Btu heat input - 0.60 lb/MM Btu of heat input

solid fossil fuel fired: (except Lignite): 0.70 lb/MM Btu of heat input

2. Exception

a) The standards for section VIII shall not apply to

VIII. Emission Standards for Nitrogen Oxides (NO_x) (Contd.)

internal combustion engines having a heat input of less than 200 MM Btu/hr.

IX. Standards for Hydrocarbons

A. Hydrocarbon emissions shall be limited by all persons handling, transporting, or storing volatile organic compounds to prevent unnecessary emissions to the extent that applicable Wyoming ambient air standards are not exceeded. Measures considered appropriate for such control (or equivalent control methods) include:

1. All organic compounds from vapor blowdown or emergency relief systems shall be burned by smokeless flares or an equally effective control device:

2. The storage of gasoline or petroleum distillates having a Reid Vapor Pressure (RVP) in excess of five pounds in any stationary tank, reservoir, or other container of more than 65,000 gallons shall be in a pressure tank capable of maintaining working pressures sufficient at all times to prevent vapor or gas loss to the atmosphere;

3. Floating roofs, consisting of the pontoon type, double deck type roof, or internal floating cover resting on the liquid surface, and equipped with seals between the roof and tank wall. Tank gauging devices shall be gas tight except when tank gauging or sampling is taking place;

4. Vapor recovery systems capable of collecting volatile organic vapors and disposal systems capable of processing such vapors in a manner that prevents their discharge to the atmosphere.

WYOMING SOLID WASTE MANAGEMENT RULES AND REGULATIONS

Basis: Solid Waste Management Rules and Regulations (1975), Authorized by the Wyoming Environmental Quality Act, Article 5, Section 35-502.42 through 44.

Agency: Department of Environmental Quality

I. Industrial and Hazardous Waste Facility Construction and Operation Approval

A. New Facilities - Each person planning an industrial or hazardous waste facility must submit construction and operating plans to the Department for approval.

II. Minimum Standards for Industrial Disposal Sites

A. Each industrial site must meet or exceed the following:

1. All sites must be fenced or otherwise guarded if the site is receiving materials that will be harmful to the public and animals.

2. All sites must be located in areas that will not cause nuisances or hazards.

3. Sites shall be constructed in such a manner that surface water will not run onto, into or out of the working area.

4. Sites shall not be located nearer than 500 feet to a drinking water supply well, stream, reservoir, lake, water treatment plant, or raw water intake unless engineering data shows that materials from the site will not enter these areas.

5. Sites shall be designed such that fumes, gases, leachate, solids, particulates or liquids will not enter the air or water so as to violate the air quality or water quality standards.

III. Minimum Standards for Hazardous Waste Disposal Sites

A. Hazardous waste sites shall meet or exceed the following:

1. All sites shall be located away from flood plains, natural depressions and excessive slopes unless detailed engineering plans indicate the acceptability of a site in these areas.

III. Minimum Standards for Hazardous Waste Disposal Sites (Contd.)

2. Sites shall not be located near a drinking water supply well, stream, reservoir, lake, water treatment or raw water intake which furnishes water to a public water system.

3. Whenever possible, sites shall be located in areas where impermeable soils are located.

4. The site shall be designed to contain any runoff from accidental spills at the site.

5. The site shall be located and designed in such a manner so as not to create nuisances or hazards.

6. All sites shall be designed in such a manner that all materials will be totally contained on the site.

7. Appropriate hazardous waste signs shall be provided.

8. The site shall be closed off and permanently isolated from humans and animals.

XVI. DELAWARE RIVER BASIN WATER REGULATIONS - NEW SOURCES

Agency: Delaware River Basin Commission
Signatory Parties to Delaware River Basin Compact:
United States of America, Delaware, New Jersey, New York, Pennsylvania

Groundwater Quality Criteria

I. GENERAL

A. Definitions

1. Groundwater includes all water beneath the surface of the ground.

B. Applicability

1. This part shall apply to the groundwater of the Delaware River Basin.

C. Groundwater Uses to be Protected

1. The quality of groundwater shall be maintained in a safe and satisfactory condition, except where such uses are precluded by natural quality, for use as:

   a) domestic, agricultural, industrial, and public water supplies;

   b) a source of surface water suitable for recreation, wildlife, fish and other aquatic life, and

   c) for other uses as may be designated by the Commission.

D. Groundwater Quality Standards and Limitations.

1. The groundwaters of the Basin shall not contain substances or properties attributable to the activities of man in concentrations or amounts sufficient to endanger or preclude the water uses to be protected.

   a) Within this requirement, the groundwaters shall be free from substances or properties in concentrations or combinations which are toxic or harmful to human, animal, plant, or aquatic life, or that produce color, taste, or odor of the waters.

I. GENERAL (CONTD.)

c) Notwithstanding any other criteria or requirements of this Section, the Commission may establish requirements, conditions, or prohibitions which, in its judgement, are necessary to protect groundwater quality.

Exception. Certain activities otherwise prohibited in this subsection D.3. such as certain approved solid or liquid waste disposal systems may be permitted subject to Commission prescribed requirements.

Surface Water Quality Criteria

I. GENERAL

A. Definitions

1. "Intrastate streams (water bodies) - nontidal" refers to those rivers, lakes, and other waters of the Delaware River Basin that flow across or form a part of state boundaries.

2. "Interstate streams (water bodies) - tidal" refers to the Delaware River Estuary and Bay, including the tidal portions of the tributaries thereof.

3. "Biochemical oxygen demand (BOD)." Biochemical oxygen demand as determined under standard laboratory procedures for 5 days at 20°C.

4. "Carbonaceous oxygen demand (COD)." That part of the ultimate oxygen demand associated with biochemical oxidation of carbonaceous, as distinct from nitrogenous, material.

5. "Effective disinfection" means the destruction of pathogenic organisms in such manner and under such controls as shall be prescribed by Commission regulations.

6. "Secondary treatment."

   a) The removal of practically all suspended solids at all times;

I. GENERAL (CONTD.)

b) The reduction of the biochemical oxygen demand by at least 85 percent;

c) May include the in-plant control of industrial wastes as prescribed by the Commission.

7. "River mile (R.M.)." The distance in statute miles of a location or item measured from "mile zero." [Separate methods of measuring distances from and of defining mile zero for a) the Delaware Bay and River and b) tributaries are included in the regulations].

8. "Ambient temperature" is the temperature of a water body unaffected by the heated waste discharge or waste discharge complex.

9. "Natural temperature" is the temperature of a water body unaffected by artificial sources of waste heat.

10. "Stream temperature" is the temperature of the stream outside of the heat dissipation area.

B. Applicability

1. This part shall apply to all surface waters of the Delaware River Basin.

C. General Provisions

1. Nondegradation of Interstate Waters.

It is the policy of the Commission to maintain the quality of interstate waters, where existing quality is better than the established stream quality objectives, unless it can be affirmatively demonstrated to the Commission that such change is justifiable as a result of necessary economic or social development or to improve significantly another body of water. In implementing this policy, the Commission will require the highest degree of waste treatment determined to be practicable. No change will be considered which would be injurious to any designated present or future use.

Surface Water Quality Criteria (Contd.)

I. GENERAL (CONTD.)

2. Combined sewers.

   Any new facility or project combining sanitary or industrial waste with stormwater drainage which would have a substantial effect on the quality of waters of the Basin shall not be permitted.

3. Zones.

   The Delaware River and Bay and their tributaries may be divided into zones which will facilitate the management of water quality.

4. Streamflow.

   Numerical stream quality objectives are based on a minimum consecutive 7-day flow with a 10-year recurrence interval.

5. Intrastate tributaries - Effluents.

   In addition to the requirements of this Article, effluent quality requirements on intrastate tributaries shall include such regulations as the State in which the tributary is located may impose in order to comply with the water quality criteria provided herein.

6. Any of the signatory parties may impose water quality criteria and/or effluent quality requirements with respect to waste discharges within its jurisdiction in excess of those provided herein. Where applicable state standards require higher quality water than these criteria, state standards will be controlling.

7. Water Uses

   a) Water uses shall be paramount in determining stream quality objectives which in turn shall be the basis for determining effluent quality requirements.

   b) Uses to be protected. The quality of Basin waters shall be maintained in a safe and satisfactory condition for the following uses:

I. GENERAL (CONTD.)

(1) After reasonable treatment:

(a) public water supplies

(b) industrial water supplies

(c) agricultural water supplies

(2) Relating to fish and other aquatic life and/or wildlife:

(a) maintenance and propagation of resident fish and other aquatic life

(b) maintenance and propagation of trout

(c) spawning and nursery habitat for anadromous fish

(d) passage of anadromous fish

(e) maintenance and propagation of shellfish

(f) wildlife

(3) Recreation

(a) recreation

(b) recreation with secondary contact

(4) Navigation

[The regulations specify which of these water uses to be protected are applicable to each of the zones described in C.8. below.]

8. Zones

For purposes of specifying receiving water quality and effluent quality criteria the surface waters have been divided into the following zones as authorized by I.C.3. herein:

I. GENERAL (CONTD.)

a) Nontidal interstate waters: Zones 1A, 1B, 1C, 1D, 1E, E, W1, W2, N1, N2, C1, C2, C3, C4, C5, C6, C7, C8

b) Tidal interstate waters: Zones 2, 3, 4, 5, 6

c) Illustrative descriptions of above zones:

i) Zone 1A is that part of the Delaware River extending from the confluence of the East and West Branches of the Delaware River at Hancock, New York, R.M. (River Mile) 330.7, to the Route 652 bridge at Narrowsburg, New York, R.M. 289.9.

ii) Zone 1B is that part of the Delaware River extending from the Route 652 bridge at Narrowsburg, New York, R.M. 289.9, to the U.S. Routes 6 and 209 bridge at Port Jervis, New York, R.M. 254.75.

iii) Zone 2 is that part of the Delaware River extending from the head of tidewater at Trenton, New Jersey, R.M. (River Mile) 133.4 (Trenton-Morrisville Toll Bridge) to R.M. 108.4 below the mouth of Pennypack Creek, including the tidal portions of the tributaries thereof.

iv) Zone 3 is that part of the Delaware River extending from R.M. 108.4 to R.M. 95.0 below the mouth of Big Timber Creek, including the tidal portions of the tributaries thereof.

II. SPECIFIC RECEIVING WATER QUALITY CRITERIA

A. Receiving Water Quality Criteria - All Receiving Waters

1. The waters of the Basin shall not contain substances attributable to municipal, industrial, or other discharges in concentrations or amounts sufficient to preclude the specified water uses

II. SPECIFIC RECEIVING WATER QUALITY CRITERIA (CONTD.)

to be protected. Within this requirement:

a) the waters shall be substantially free from unsightly or malodorous nuisances due to floating solids, sludge deposits, debris, oil, scum, substances in concentrations or combinations which are toxic or harmful to human, animal, plant, or aquatic life, or that produce color, taste, odor of the water or taint fish or shellfish flesh;

b) There shall be no readily visible oil.

c) Toxic Substances - Specific Criteria

i) The concentration of a toxic substance in Basin waters shall not exceed one-twentieth of the TL_{50} value at 96 hours, as determined by appropriate bioassays, except in designated mixing areas. Criteria for combinations of toxic substances will be based upon the same principle.

ii) The substances listed below shall not exceed the specified limits or one-twentieth of the TL_{50} value at 96 hours, whichever is lower.

	limit mg/l
Arsenic	0.05
Barium	1.0
Cadmium	0.01
Chromium (hexavalent)	0.05
Lead	0.05
Mercury	0.005
Selenium	0.01
Silver	0.05

iii) The concentration of a persistent pesticide in Basin waters shall not exceed one one-hundredth of the TL_{50} value at 96 hours, as determined by appropriate bioassay. (Persistent pesticides are defined as natural and synthetic materials having a half-life of greater than 96 hours, which are used to control unwanted or noxious animals or plants. They include fungicides, herbicides, insecticides, fumigants and rodenticides.

Surface Water Quality Criteria (Contd.)

II. SPECIFIC RECEIVING WATER QUALITY CRITERIA (CONTD.)

d) The concentration of total dissolved solids shall not exceed 133% of background.

2. Public water supplies.

In no case shall concentrations of substances exceed those values given for rejection of water supplies in the United States Public Health Service Drinking Water Standards.

B. Receiving Water Quality Criteria - Interstate Streams and Bodies, Nontidal

1. Criteria for these waters are shown in the designated column on Table 1 in II.C. below. Values shown are the most stringent of criteria specified for the 18 separate nontidal interstate water zones described in subsection I.C.8.

C. Receiving Water Quality Criteria - Interstate Streams and Bodies, Tidal

1. Criteria for these waters are shown in the designated column on Table 1 below. Values shown are the most stringent of criteria specified for the 5 separate tidal interstate water zones described in subsection I.C.8.

TABLE 1

CRITERIA FOR INTERSTATE RECEIVING WATERS

Item or Condition	Nontidal Waters	Tidal Waters
pH, range (allowable)	6.5-8.5	6.5-8.5
Phenols, mg/l (max.)	0.005	.005
Threshold Odor No. (max. at 60°C)	24	24
Synthetic Detergents (M.B.A.S.), mg/l (max.)	0.5	0.5
Radioactivity		
alpha emitters, picocuries/l (max.)	3	3
beta emitters, picocuries/l (max.)	1000	1000
Fecal coliforms, number/100 ml (max.; adequate care required as to sample frequency and location)	200	200
Dissolved 0 , mg/l (min. anytime),	5.0	-
mg/l (min. 24 hr. avg.),	6.0	6.0
mg/l (min. in spawning areas when temperatures suitable for trout spawning)	7.0	6.5[a]
Total Dissolved Solids (max.)		
% of background, or	133% or	133% or
mg/l (lesser of)	500	500
Turbidity (unless exceeded by natural conditions)		
units (max. 30 day avg.)	10	40
units (max. anytime)	150	150[b]
Temperature Rise Allowed (above ambient receiver temp.; except in designated heat dissipation areas)		[c]
°F, for Stream temp. ≤ 50°F	5	
°F, for Stream temp. 50°F ≤ 58°F	2	
°F, for Stream temp. < 58°F	0	
Alkalinity, mg/l, range	-	20-100
Chlorides, mg/l, max. 15 day avg.	-	50
Hardness, mg/l, max. 30 day avg.	-	95

(a)The concentration shown is the minimum concentration during the periods from April 1 to June 15, and September 16 to December 31.

(b)Except above R.M. 117.81 (river mile) during the period of May 30 to September 15 when turbidity shall not exceed 30 units.

(c)Receiving water temperature (tidal waters) shall not be raised above ambient by more than:
4°F during September through May, nor
1.5°F during June through August
nor shall the maximum temperature exceed 85°F at any time.

II. SPECIFIC RECEIVING WATER QUALITY CRITERIA (CONTD.)

D. Effluent Quality Requirements

1. Minimum treatment.

All wastes shall receive a minimum of secondary treatment (defined in I.A.) regardless of the stated stream quality limitations.

2. Disinfection.

Wastes (exclusive of storm-water by-pass) containing human excreta or disease producing organisms shall be effectively disinfected before being discharged into surface bodies of water.

3. Public safety.

Effluents shall not create a menace to public health or safety at the point of discharge.

a) Temperature. Maximum 110°F (43.3°C) where readily accessible to human contact.

4. Suspended solids.

For municipal and industrial waste treatment facilities, at least 90 percent removal as determined by an average of samples taken over each period of 30 consecutive days of the year and not to exceed 100 mg/l, whichever is less.

5. Allocation of capacity.

Where necessary to meet the stream quality limitations of the waste assimilative capacity of the receiving waters shall be allocated in accordance with the doctrine of equitable apportionment.

6. Limits.

Discharges shall not contain more than negligible amounts of debris, oil, scum, or other floating materials, suspended matter which will settle to form sludge, toxic substances, or substances or organisms that produce color, taste, odor of the water, or taint fish or shellfish flesh.

II. SPECIFIC RECEIVING WATER QUALITY CRITERIA (CONTD.)

Within this requirement:

a) Oil.

Not to exceed 10 mg/l; no readily visible oil.

b) Debris, scum, or other floating materials. None.

c) Toxicity.

i) Not more than 50 percent mortality in 96 hours in an appropriate bioassay test with a 1:1 dilution. Wastes containing chlorine may be dechlorinated prior to the bioassay test.

ii) Notwithstanding the results of the tests prescribed in paragraph i) above, the substances listed below being accumulative or conservative, shall not exceed the following specified limits in an effluent.

	limit mg/l
Arsenic	0.1
Barium	2.0
Cadmium	0.02
Chromium (hexavalent)	0.10
Copper	0.20
Lead	0.10
Mercury	0.01
Selenium	0.02
Zinc	0.60

iii) Persistent pesticides - not to exceed one one-hundredth of the TL_{50} value at 96 hours as determined by appropriate bioassay.

d) Odor.

Not to exceed a threshold number of 250.

e) Dissolved Oxygen - Interstate Nontidal Streams.

The discharge of an effluent, after dispersion in the water of the river, shall not cause a reduction of the dissolved oxygen content of such water of more than five percent.

f) Carbonaceous Oxygen Demand (COD)

The carbonaceous oxygen demand from an outfall (exclusive of stormwater by-pass) shall not exceed that assigned by the Commission to maintain stream quality objectives.

g) Biochemical Oxygen Demand (BOD)

i) Interstate nontidal streams. No discharge shall exceed 50 mg/l.

ii) Interstate tidal streams. No discharge shall exceed 100 mg/l.

iii) In either i) or ii) above a slight deviation may be permitted by the Commission when such deviation results from reduced secondary treatment plant efficiency caused by wastewater temperatures below 59°F.

h) pH

i) Between 6 and 9

ii) Where streams have high acidity levels a discharge with a pH greater than 9 may be permitted.

i) Ammonia

i) Nontidal waters - not to exceed 20 mg/l (as nitrogen), 30 day average

ii) Tidal waters - not to exceed 35 mg/l (as nitrogen), 30 day average

j) Dissolved substances.

Dissolved and colloidal substances, including nutrients, discharged in waste effluents shall be limited where necessary to prevent

Surface Water Quality Criteria (Contd.)

II. SPECIFIC RECEIVING WATER QUALITY CRITERIA (CONTD.)

deposition of sediments, formation of flocculent materials, or excessive aquatic growths, that impair protected uses, violate water quality criteria, or generate additional oxygen demands upon the receiving waters.

k) Total dissolved solids.

i) Not to exceed 1,000 mg/l.

A discharge with a greater concentration may be permitted:

- provided that stream background will not be increased by more than 1.6 percent (stream background is the stream condition were there no waste discharge)
- except that this percentage may be modified upon application, to reflect physical conditions of the stream in relation to the water quality criteria and the present and foreseeable discharge along the affected reach.

XVII. MEXICO: WATER REGULATIONS - NEW SOURCES

Agencies: Secretariat for Water Resources;
Secretariat for Health and Welfare;
Secretariat for Industry and Trade

I. GENERAL

A. Definitions

1. "Assimilative capacity" means the property possessed by a receiving water, calculated on the basis of the projected discharge rate [gasto de diseno], whereby its quality is restored in such a manner that the established quality standards are not infringed in time or space.

2. "Dilution capacity" means the quantity of any element, compound, or substance that can be absorbed by a receiving water without exceeding at any time or place the maximum concentration of the particular element, compound, or substance laid down in the quality standard for the particular receiving water, taking as the basis for the calculation the normal projected discharge rate and the normal projected volume.

3. "Classification of surface waters" means the designation given to the water in a river, lake, estuary, or coastal zone, or any part thereof, with a view to its usage for different legitimate human activities.

4. "Estuary" means the part of a river that is subject to the influence of tides and is limited in length to the zone within which the concentration of chlorides is equal to 250 mg/1 or more during low-water periods.

5. "Receiving water" means any catchment system, river, river basin, riverbed, reservoir, or deposit of waters capable of directly or indirectly receiving wastewater discharges.

B. General Provisions

1. In order to preserve and restore the quality of receiving waters, the prevention and control of water pollution must be effected, under the terms of these regulations, by means of the following procedures:

I. GENERAL (CONT)

a) the treatment of wastewaters in order to control the levels of settleable solids, greases and oils, and floating matter, as well as the temperature and pH; and

b) the estimation of and adherence to specific conditions for wastewater discharges, by treating the latter, where appropriate, in accordance with the results of studies carried out by the competent authority on the receiving waters concerned, their assimilative capacity and dilution capacity, and other factors.

2. Measures relating to public and industry awareness, information and education.

a) Within their respective spheres of jurisdiction, the agencies of the Federal Executive shall draw up and implement plans, campaigns, and any other activities contributing to education, information, and dissemination of knowledge in respect to the significance of the problem of water pollution, its consequences, and, in general, methods for its prevention, control, and abatement.

b) The Secretariat for Public Education shall invite the National Council of Science and Technology and other scientific and technical research institutes within the country to undertake, in conjunction with the Secretariats for Water Resources, Health and Welfare, Agriculture and Livestock Breeding, and Industry and Trade, studies and research on new methods, systems, equipment, apparatus, and other devices enabling the prevention, control, and abatement of water pollution.

c) The Secretariats for Health and Welfare, Water Resources, and Agriculture and Livestock Breeding, the Department of Agrarian Affairs and Colonization, and, where appropriate, the Secretariat for Shipping and the Department for the Federal District, may seek the advice of the National Council of Science and Technology in regard to research on the planning, programming, coordination, orientation, harmonization, promotion, and implementation of activities related to the prevention and control of water pollution.

I. GENERAL (CONT)

d) The Chambers of Industry, National Chambers of Commerce, and their respective Confederations shall co-operate with the authorities by keeping their members informed of the measures to be adopted for the prevention and control of water pollution and for the preservation and restoration of water quality.

3. Except in the cases excepted by these Regulations, it shall be prohibited to dump or deposit garbage and other wastes resulting from human activities, solid objects, rubble, industrial sludge, and the like into rivers, riverbeds, reservoirs, estuaries, and other receiving waters.

It shall likewise be prohibited to deposit, in areas adjacent to receiving waters, the wastes or residues referred to in the preceding paragraph where these are liable to be drawn into the waters in question.

4. The persons responsible for wastewater discharges within a given area may group together to construct joint works or installations, in order to effect a single discharge, which must meet the standards laid down herein.

Whenever a discharge is effected into nationally owned waters, the authorization of the Secretariat for Water Resources shall be required.

In all other cases, the Secretariat for Water Resources shall act in coordination with the competent local authorities for the purposes referred to in this Section.

5. Surface receiving waters have been classified according to their uses in the following manner:

DA	For drinking water and food industry supply systems, with disinfection only. Recreation (primary contact) and free for DI, DII and DIII uses.
DI	For drinking water supply with conventional treatment (coagulation, sedimentation, filtration, and disinfection) and for industrial purposes.

I. GENERAL (CONT)

DII	Water suitable for recreational use, conservation of flora and fauna, and for industrial purposes.
DIII	Water suitable for agricultural or industrial purposes.
DIV	Water for industrial purposes (except for food processing).

II. WASTEWATER DISCHARGE (EFFLUENT) LIMITATIONS.

A. Unless specific criteria for individual discharges have been laid down in accordance with [these regulations], the provisions of the table below shall apply to all wastewater discharges:

	Maximum Permissible Levels
Settleable solids	1.0 mg/l
Greases and oils	70 mg/l
Floating matter	No floating matter that is retained by a screen having an aperture size of 3 mm
Temperature	35°C
pH	4.5-10.0

III. RECEIVING WATER QUALITY STANDARDS

A. The limitation and tolerance levels in TABLE 1 are general criteria and shall be the basis for specific conditions for any individual wastewater discharges laid down by the Secretariat for Water Resources.

B. Toxic Substance Limitations.

TABLES 2 and 3 list some of the toxic substances subject to regulation and investigation in various parts of the world. The values shown for the various substances are guidelines, not limitations, and are subject to modification as new scientific and technological data become available.

TABLE 1. STANDARDS FOR SURFACE RECEIVING WATERS

Class* (by water use)	(1) pH	(2) Temperature (°C)	(3) DO** (mg/l)	(4) Coliform bacteria (MPN** of bacteria per 100 ml)	(5) Oils and greases (mg/l)	(6) Dissolved solids (mg/l)	(7) Turbidity (JTU)**	(8) Coloration (platinum-cobalt scale	(9) Odor and taste	(10) Nutrients: nitrogen and phosphorus	(11) Floating matter	(12) Toxic substances
			Maximum limit	Maximum limit	Maximum limit	Maximum limit	Maximum limit	Maximum limit	Minimum limit	Maximum limit		
DA	6.5 to 8.5	2.5° above NC** (a)	4.0	200 fecal coliforms (b)	0.76	Not to exceed 1000	10	20	Absent	(c)	Absent	(d)
DI	6.0 to 9.0	2.5° above NC (a)	4.0	1000 fecal coliforms (c)	1.0	Not to exceed 1000	NC	(f)	(g)	(c)	Absent	(d)
DII	6.0 to 9.0	2.5° above NC (a)	4.0	10000 total coliforms as the monthly mean; no value greater than 20000 (h)	No visible film	Not to exceed 2000	NC	NC	NC	(c)	Absent	(d)
DIII	6.0 to 9.0	2.5° above NC (a)	3.2	1000 (j); no restrictions for other crops	No visible film	(i)	NC	NC plus 10		(c)	Absent	(d)
DIV	5.0 to 9.5		3.2									(d)

* See I.B.5. herein for details on the various water use classifications shown.

**DO = Dissolved oxygen MPN = Most probable number JTU = Jackson Turbidity Unit NC = Normal Conditions

NOTE: See footnotes on following page

TABLE 1. STANDARDS FOR SURFACE RECEIVING WATERS (CONT)

Footnotes for Table 1:

(a) Maximum 30°C, except when caused by natural conditions. Measured at the surface, outside the mixing zone.

(b) This category may have a fecal coliform count greater than 200 in not more than 10% of all the monthly samples taken (minimum 5).

(c) Must not be present in amounts causing hyperfertilization.

(d) The criteria relating to toxic substances are as follows:

No toxic substance may be present, either alone or in combination with others, at concentrations liable to make the receiving waters in question unsuitable for the specific purpose for which they are intended. (See the table on toxic substance limitations in III.B. below).

(e) This category may have a fecal coliform count greater than 2000 in not more than 10% of all the monthly samples taken (minimum 5).

(f) No artificial coloring is permitted if it cannot be coagulated by conventional treatment methods.

(g) Removable by conventional treatment methods.

(h) Fecal coliform count of 2000 as a monthly mean, with no value exceeding 4000.

(i) Conductivity no greater than 2000 /cm (S/cm). If the sodium absorption factor is greater than 6, the Secretariat for Water Resources is to fix the maximum value permitted.

Boron, 0.4 mg/l. For higher values, the competent authority is to establish the maximum value permitted.

(j) For irrigation of vegetables that are consumed unboiled or fruit in contact with the soil.

TABLE 2. MAXIMUM PERMISSIBLE QUANTITIES OF TOXIC SUBSTANCES IN RECEIVING WATERS*

(Maximum Values in mg/l)

	DA	DI	DII	DIII
Arsenic	0.05	0.05	1.00	5.00
Barium	1.00	1.00	5.00	-
Boron	1.00	1.00	-	2.0
Cadmium	0.01	0.01	0.01	0.005
Copper	1.00	1.00	0.1	1.0
Hexavalent chromium	0.05	0.05	0.1	5.00
Mercury	0.005	0.005	0.01	-
Lead	0.05	0.05	0.10	5.00
Selenium	0.01	0.01	0.05	0.05
Cyanide	0.20	0.20	0.02	-
Phenols	0.001	0.001	1.00	-
Substances reacting to methylene blue (detergents)	0.50	0.50	3.0	-
Substances that are extractable with chloroform	0.15	0.15	-	-
Radioactivity (Picocuries/l)				
Beta activity	1.000	1.000	1.00	-
^{226}Ra	3	3	3	-
Strontium	10	10	10	-

*See I.B.5 herein for water use classifications used.

TABLE 3. MAXIMUM PERMISSIBLE QUANTITIES OF TOXIC SUBSTANCES IN ESTUARIES

(Maximum Values in mg/l)

Arsenic	1.00
Cadmium	0.01
Copper	0.05
Hexavalent chromium	0.01
Mercury	0.00
Lead	0.10
Phenols	0.10
Substances reacting to methylene blue (detergents)	0.50
Nickel	0.10
Zinc	10.00
Sulfides	0.50
Fluorides	1.50
Ammonia	0.80
Cresols	1.50
Cyanide	0.00

MEXICO - AIR STANDARDS: STANDARDS OF PERFORMANCE FOR NEW STATIONARY SOURCES

Agencies: Ministry of Health and Welfare;
Ministry of Industry and Commerce

I. GENERAL PROVISIONS

A. Definitions

1. "Emission" means the direct or indirect discharge into the atmosphere of any substance, other than water in its uncombined forms, including but not limited to odors, particulates, vapors, gases or any combination of these.

2. "Dust" means small particles emitted into the atmosphere by natural elements or by mechanical processes, such as milling, drilling, transportation of earth, demolition and others.

3. "Fugitive dust" means particulate suspended in the air emitted by any source other than a chimney.

4. "Combustion equipment" means all equipment or mechanisms related to the combustion or burning of combustibles, including incinerators, boilers, pressure vessels, equipment for burning trash, fuels or any combustible material from which the products of combustion are emitted. Equipment that generates heat and may emit products of combustion, as well as mechanical, metallurgical, chemical and manufacturing processes that may emit smoke, suspended materials or other atmospheric pollutants, are included.

5. "Smoke" means those particles resulting from an incomplete combustion, composed mainly of coal, ashes and other combustible materials that are visible in the atmosphere, and similar particles resulting from the sublimation of metals.

6. "Process" means any action, operation or treatment, including chemical, industrial or manufacturing elements, as well as manufacturing or processing methods or operations that may emit smokes, solid particles, gases or any other pollutant.

I. GENERAL PROVISIONS (CONTD.)

7. "Process weight" is the weight of all the materials introduced in a specific process and which may cause emissions. Solid fuels are considered a part of the process weight, but liquid and gaseous fuels and combustion air are not.

II. VISIBLE EMISSION STANDARDS

A. Combustion Equipment and/or Incinerators

1. Maximum Emissions

a) No. 2 on Ringelmann Chart or equivalent opacity.

III. EMISSION STANDARDS FOR PARTICULATE MATTER

A. Process Industries

1. Maximum Emissions

For process weight rates up to and including 28.5 metric tons per hour:

$$E = 5.805(P)^{0.67}$$

where: E = Maximum allowable emissions in kilograms per hour
P = Process weight in metric tons per hour

For process weight rates greater than 28.5 metric tons per hour:

$$E = 75.648(P)^{0.11}-54.42$$

B. Process Industries - Alternate Standards

1. Where it is not possible to apply III.A. above to a facility or operation, use the following table of maximum particulate concentration allowed in source exhaust gases:

III. EMISSION STANDARDS FOR PARTICULATE MATTER (CONTD.)

Maximum allowable particulates concentration.

Exhaust Gas Volume at the Source, m normal	Allowable Particulates Concentration, mg/m normal
100	849.0
125	795.0
150	750.0
175	714.0
200	684.0
300	600.0
400	543.0
500	510.0
750	444.0
1,000	406.0
1,500	357.0
2,000	324.0
3,000	285.0
4,000	258.0
5,000	240.0
7,500	210.0
10,000	192.0
15,000	168.0
20,000	154.2
30,000	135.0
40,000	123.0
50,000	114.0

2. Multiple Chimneys: Determination of Allowable Particulates

   Where one process or a group of processes utilizes separate chimneys.

   a) The total allowable emissions shall first be determined for the process or complex of processes as per III.A. or III.B. above. The emissions allowed through any single chimney shall then be such proportion of the total allowable emissions as the process weight rate (or exhaust gas rate) associated with the process or processes emitting through that chimney are to the total process weight rate (or total exhaust gas rate).

III. EMISSION STANDARDS FOR PARTICULATE MATTER (CONTD.)

C. Incinerators and Fuel Burning Equipment (for Indirect Heating)

1. Maximum Emissions Where Fuel is Petroleum Derived
   for ≥ 63 MM kcal/hr heat input:
   45 grams/MM kcal heat input
   for < 63 MM kcal/hr heat input:
   80 grams/MM kcal heat input

2. Maximum Emissions Where Solid Fuel is Burned
   for ≥ 40 MM kcal/hr heat input:
   1 kg/MM kcal heat input
   for < 40 MM kcal/hr heat input:
   1.5 kg/MM kcal

IV. STANDARDS FOR FUGITIVE DUST

A. The system for the control of fugitive dust which is designated by the Ministry of Health and Welfare in permits issued for any new industrial process or operation shall be installed and utilized.

XVIII. CANADA - FEDERAL: WATER REGULATIONS

Agencies: Environmental Protection Service (E.P.S.),
Branch of Fisheries and Environment Canada -
Water Pollution Control Directorate and
Federal Activities Environmental Branch of
Environmental Conservation Directorate

I. GENERAL

A. Definitions

1. "Advanced Wastewater Treatment" means treatment systems which are designed to remove pollutants which are not adequately removed by conventional secondary treatment processes.

2. "Best Practicable Technology" involves the use of production processes, activity practices, and control equipment that are technically feasible and economically possible. It is dynamic and will be progressively updated in the light of new developments in technology, social attitudes and pressures of continued growth.

3. "Biochemical Oxygen Demand (BOD)" means the quantity of oxygen used in the biochemical oxidation of organic matter in five days at 20°C under aerobic conditions.

4. "Chlorine Residual" means the amount of chlorine (combined and free available chlorine) remaining in effluents after a specified contact time.

5. "Effluents" means any wastewater discharged directly or indirectly to surface waters or to any storm sewer, and the runoff from land used for disposal of wastewater sludges, spray irrigation, or other wastes, but does not otherwise include land runoffs.

6. "Fecal Coliform Bacteria" means organisms associated with the intestines of warm blooded animals that are commonly used to indicate the presence of fecal material and the potential presence of organisms capable of causing disease in man.

7. "Receiving Water" means surface or ground waters which have either treated or untreated wastes discharged to them.

I. GENERAL (CONT)

8. "Secondary Treatment" means a combination of biological or chemical processes with mechanical and/or gravitational methods to remove dissolved, colloidal, and suspended matter. This degree of treatment is considered to result in at least 85% removal of suspended solids and BOD.

9. "Suspended Solids" means solid matter that either floats or is suspended in water, sewage or other liquids and which can be largely removed by laboratory filtering.

10. "Total Phosphorus" means the sum of all forms of phosphate normally present in domestic wastewater, including ortho-phosphates, polyphosphates metaphosphates, pyrophosphates and organic phosphates, expressed in terms of concentration of P.

11. "Wastewater" means the spent water of a community. From the standpoint of source, it may be a combination of the liquid and water-carried wastes from residences, commercial buildings, industrial plants, and institutions, together with any groundwater, surface water, and storm water that may be present. In recent years, the word wastewater has taken precedence over the word sewage.

12. "24-hour Composite Sample" means a 24-hour composite sample consisting of several effluent portions (usually one per hour) collected in a 24-hour period and composited according to flow.

13. "Grab Sample" means a single sample of wastewater taken neither at a set time nor flow.

B. GENERAL PROVISIONS

1. It is the policy of the Federal Government to set and maintain a high national standard in keeping with a role of national leadership in environmental protection with respect to its own activities. Facilities for water pollution control are to reflect sound engineering and best practicable technology regardless of dilution available from receiving waters. Effluent guidelines for wastewater from Federal facilities are to be equal to or more stringent than the established standards or requirements of any Federal or Provincial regulatory agency. Such an approach is designed to demonstrate leadership on the part of the Federal Government.

I. GENERAL (CONT)

2. Dilution.

Dilution of an effluent prior to its discharge for the expressed purpose of attaining specific limits is not acceptable.

When feasible, cooling water and other clean water should be segregated from the wastewater and discharged to storm drainage systems.

3. Environmental Compatibility.

All wastewater treatment systems serving Federal establishments should take into account all aspects of environmental protection and energy conservation. Efforts should be made to conserve natural resources and to preserve natural beauty, wildlife, recreational areas, historic sites and private property. Attention should be given to the general aesthetic appearance of the facility and to the prevention of possible odour and fly problems.

4. Storm Sewer Discharges

Only clean, unpolluted water should be discharged to storm sewers and other storm drainage systems since these flows will not normally receive treatment before discharge to receiving waters. Discharges that are acceptable include roof and foundation drains and, depending upon the activity carried out, runoff from ground and paved areas. Unpolluted, cooling water may be discharged to storm sewers provided the temperature limits noted herein are not exceeded. Under no circumstances should sanitary sewer connections to storm sewers be permitted.

In order to ensure that any proposed discharges to the storm drainage are acceptable and will not degrade receiving water quality, the Environment Protection Service should be consulted, giving the source of discharge, the volume, and if possible, its expected quality.

5. Mixing Zones

In assessing the effect of an effluent on a receiving water, an opportunity should be allowed for the mixture of an effluent with its receiving

I. GENERAL (CONT)

water. The design and location of an outfall should be established on a case by case basis, in consultation with the local EPS office, and should be based on the following:

1) The physical, chemical and biological characteristics of the body of water;

2) The present and anticipated future use and water quality of the body of water. In addition, the zone of influence should be so established as to assure a reasonable zone of passage for aquatic life in the stream.

Mixing zones should not be used as a substitute for adequate treatment or control of discharges at their source, nor should they occupy the total width of a waterway thereby blocking the passage of fish and other aquatic organisms. The water quality objectives should be met at the periphery of these zones.

II. EFFLUENT DISCHARGE CRITERIA AND LIMITATIONS - EFFLUENTS FROM FEDERAL ESTABLISHMENTS

A. Applicability

These guidelines apply to all effluents discharged from land based establishments under the direct authority of the Federal Government.

B. The Cabinet Decision of June 8, 1972, entitled "Control and Abatement of Pollution from Federal Activities - Cleanup and Prevention," calls for the cleanup of existing sources of pollution from Federal Establishments and for the screening of all new projects initiated by the Federal Government for potential adverse environmental effects. The purpose of these guidelines is to indicate the degree of treatment and effluent quality that will be applicable to all wastewater discharged from existing and proposed Federal installations. Use of these guidelines is intended to promote a consistent approach towards the cleanup and prevention of water pollution and ensure that the best practicable control technology is used.

C. When an effluent complying with the effluent guidelines specified herein results in a violation of the water quality requirements or objectives specified by another pollution control agency, appropriate action should be taken to meet whatever effluent limits are necessary to ensure compliance with the water quality requirements of such other agency. In the case where no water quality objectives are in effect for a particular receiving water, the acceptability of the effluent should be based on consultations between the appropriate Federal and Provincial agencies. Applicable reports prepared by the Department of the Environment should be used as guides in determining the acceptability of an effluent in such cases. In receiving bodies of water where water quality objectives are already exceeded upstream of the discharge point, the effluent should be of such quality as to maintain or enhance the quality of the receiving water downstream from the point of discharge.

D. General Effluent Requirements.

Effluents from the Federal establishments should be treated before being discharged to receiving waters so that they are:

1. Free from materials and heat in quantities, concentrations or combinations which are toxic or harmful to human, animal, waterfowl or aquatic life;

2. Free from anything that will settle in receiving waters forming putrescent or otherwise objectionable sludge deposits, or that will adversely affect aquatic life or waterfowl;

3. Free from floating debris, oil, scum and other materials in amounts sufficient to be noticeable in receiving waters;

4. Free from materials and heat that alone, or in combination with other materials will produce color, turbidity, taste or odour in sufficient concentration to create a nuisance or adversely affect aquatic life or waterfowl in receiving waters;

5. Free from nutrients in concentrations that create nuisance growths of aquatic weeds or algae in the receiving waters.

II. EFFLUENT DISCHARGE CRITERIA AND LIMITATIONS - EFFLUENTS FROM FEDERAL ESTABLISHMENTS (CONT)

E. Compliance with Specific Limits.

Treatment systems should be designed and operated so that the effluent quality described below will be achieved consistently. In general, compliance with the numerical limits should be based on 24-hour composite samples with the exception of those parameters which require grab sampling.

Some allowance will be given for samples to exceed the limits specified because of unrepresentative sampling and normal treatment plant upsets. For both composite and grab samples, 80 percent of a statistically reliable number of samples (minimum of five samples) in any consecutive 30-day period should not exceed the limits specified, nor should any single sample exceed five times the specified limit. Chlorine residual should be measured by the treatment plant operator at least once every two days to ensure that the specified range of residual is not being violated.

F. Specific Limits for Effluents.

Effluents discharged to receiving waters should receive treatment such that an effluent of the following minimum quality is achieved:

5 day BOD - 20 mg/l
Suspended Solids - 25 mg/l
Fecal Coliforms (MF method) - 400/100 ml (after disinfection)
Chlorine Residual - 0.50 mg/l minimum after 30 minutes contact time (1)
- 1.00 mg/l maximum
pH (range) - 6.0 to 9.0
Phenols - .02 mg/l
Oils & Greases - 15 mg/l
Phosphorus (Total P.) - 1.0 mg/l (2)
Temperature - not to alter the ambient water temperature by more than 1°C (3)

Note:
(1) Applicable where chlorination is used for disinfection purposes
(2) Applicable where phosphorus removal is required
(3) Applicable at perimeters of mixing zone

III. EFFLUENT DISCHARGE CRITERIA AND LIMITATIONS - EFFLUENTS FROM PETROLEUM REFINERIES

A. Applicability

This section controls discharges of the deleterious substances listed below from petroleum refineries:

1. Any substance capable of altering the pH of liquid effluents or once-through cooling water.
2. Oil and grease
3. Phenols
4. Sulfide
5. Ammonia nitrogen
6. Total suspended matter

B. Definitions

1. "Actual Deposit" means the aggregate quantity, measured in pounds per day, of a deleterious substance prescribed in A.2 through A.6 that is contained in all liquid effluent and once-through cooling water and that is actually deposited in any one day by a refinery.
2. "Ammonia Nitrogen" means the nitrogen in ammonia that results from the operation of a refinery, that is contained in liquid effluent or once-through cooling water from that refinery and that is determined to be present therein by the test method referred to [herein].
3. "Authorized Deposit" means the aggregate quantity, measured in pounds per day, of a deleterious substance prescribed in A.2 through A.6 that is contained in all liquid effluent and once-through cooling water and that may be deposited in any one day by a refinery under the authority of these Regulations.
4. "Deposit" means to deposit or permit the deposit in water frequented by fish.
5. "Liquid Effluent" means waste water and includes process water, cooling tower blow-down, tank draining, ballast water, storm water, wastes from water treatment facilities and run-off from land used for the disposition of waste water and sludges associated with the operation of a refinery.

III. EFFLUENT DISCHARGE CRITERIA AND LIMITATIONS - EFFLUENTS FROM PETROLEUM REFINERIES (CONT)

6. "Minister" means the Minister of the Environment.

7. "Oil and Grease" means the oil and grease that results from the operation of a refinery, that is contained in liquid effluent or once-through cooling water from that refinery and that is determined to be present therein by the test method referred to [herein].

8. "Once-Through Cooling Water" means, subject to subsection (3), water that has been circulated once through heat exchangers, either singly or in series, for the purpose of removing heat from process streams and that is not intended to come into contact with the process streams.

9. "Reference Crude Rate" means the quantity of crude oil, expressed in thousand barrels per day, that has been declared by the owner of a refinery to be the reference crude rate of the refinery.

10. "Refinery" means facilities intended primarily for the separation and conversion of crude oil into products, including liquified petroleum gas, gasolines, naphthas, heating oils, fuel oils, asphalts, lubricating oils and greases, benzene, toluene, xylene, hydrogen, sulphur and coke, and includes blending, shipping and packaging facilities located on the refinery property and all properties developed for the operation of those facilities, but does not include facilities associated with the processing of natural gas or the production of synthetic petroleum originating from coal or bituminous sands.

11. "Storm Water" means water run-off that results from precipitation of any kind that falls on a refinery and includes water run-off originating from outside the refinery that passes over or through the refinery.

12. "Stream Day Crude Rate" means the rate, in barrels per day, at which crude oil is processed in a refinery.

13. "Sulfide" means dissolved sulfide that results from the operation of a refinery that is contained in liquid effluent or once-through water from that refinery and that is determined to be present therein by the test method referred to [herein].

III. EFFLUENT DISCHARGE CRITERIA AND LIMITATIONS - EFFLUENTS FROM PETROLEUM REFINERIES (CONT)

14. "Total Suspended Matter" means the non-filterable residue that results from the operation of a refinery, that is contained in liquid effluent or once-through cooling water from that refinery and that is determined to be present therein.

15. When water deemed not storm water.

a) When storm water is protected, in such manner as the Minister may approve in writing, from contamination by the deleterious substances prescribed in A. that originate from the refinery, the storm water shall be deemed not to be storm water for the purpose of these Regulations.

b) When, prior to being deposited, liquid effluent or once-through cooling water has been treated, in such manner as the Minister may approve in writing, at a site outside a refinery for the purpose of removing therefrom the deleterious substances prescribed in A. the liquid effluent or once-through cooling water shall be deemed not to be liquid effluent or once-through cooling water for the purpose of these Regulations.

C. Specific Criteria and Standards for Prescribed Deleterious Substances

1. pH.

Subject to these regulations, the owner of a refinery may deposit the deleterious substance prescribed in paragarph A.1 if the pH of the liquid effluent or once-through cooling water is within the limits of 6.0 and 9.5.

2. Authorized Deposits of a Deleterious Substance

a) Subject to these Regulations, the owner of a refinery may deposit a deleterious substance prescribed herein if:

i) the arithmetic mean of the actual deposits of each such substance during the month in which the deposit is made does not exceed the arithmetic means of the authorized deposits of that substance in the same month for the refinery, as calculated in accordance with 4. a); and

III. EFFLUENT DISCHARGE CRITERIA AND LIMITATIONS - EFFLUENTS FROM PETROLEUM REFINERIES (CONT)

ii) the actual deposit of each such substance deposited in each day by the refinery does not exceed, for more than one day in each month, the authorized deposit of that substance for the refinery, as calculated in accordance with 4.c); and

iii) the actual deposit of each such substance deposited in each day by the refinery does not exceed the authorized deposit of that substance for the refinery as calculated in accordance with 4.d).

b) Subject to these regulations, the owner of a refinery may deposit a deleterious substance prescribed in A.2, 3, or 6. If the aggregate quantity of that substance contained in storm water being deposited in any month does not exceed the limit of the deposit authorized of that substance in the same month for the refinery, as calculated in accordance with 4.e) ii).

3. Reference crude rates.

a) When the owner of a refinery intends to deposit a deleterious substance prescribed in A.2 through 6, he shall, before making the deposit, sign, date and forward to the Minister a declaration, in such form as the Minister may prescribe, stating the reference crude rate of the refinery.

b) For the purpose of a) above; the reference crude rate of a refinery is the maximum design stream day crude rate of the refinery, divided by one thousand.

c) The owner of a refinery may revise the reference crude rate of the refinery at any time by signing, dating and forwarding to the Minister a declaration, in such form as the Minister may prescribe, stating the revised reference crude rate of the refinery.

d) The owner of a refinery that deposits a deleterious substance prescribed in A.2 through 6 shall revise the reference crude rate of the refinery if the arithmetic mean of the stream day crude rates during any two consecutive months, divided by one thousand, excluding days when crude rates have been reduced due to

III. EFFLUENT DISCHARGE CRITERIA AND LIMITATIONS - EFFLUENTS FROM PETROLEUM REFINERIES (CONT)

refinery maintenance, is less than 85 percent of the last declared reference crude rate of the refinery and shall sign, date and forward a declaration, in such form as the Minister may prescribe, stating the revised reference crude rate of the refinery.

e) For the purpose of subsection c), the revised reference crude rate of a refinery is the arithmetic mean of stream day crude rates sustained in commercial operation for at least seven consecutive days, divided by one thousand.

f) For the purpose of subsection d), the revised reference crude rate of a refinery is the arithmetic mean of stream day crude rates sustained in commercial operation for at least fourteen consecutive days, divided by one thousand.

g) The revised reference crude rate of a refinery takes effect on the first day of the month in which it is declared.

4. Calculation of Authorized Deposits

a) For the purpose of 2.a)i) the arithmetic mean of the authorized deposits for a refinery for a month shall be calculated using the amounts obtained in the calculations made under subsection b).

b) The authorized deposit for a refinery of a deleterious substance prescribed in A.2 through 6 shall, subject to e), be calculated for each day by multiplying the amount in column II of an item of Schedule I for the deleterious substance by the reference crude rate of the refinery for that month.

c) For the purpose of 2.a)ii), the authorized deposit for a refinery of a deleterious substance prescribed in A.2. through 6 shall, subject to e) below, be calculated by multiplying the amount set out in column III of an item of Schedule I for the deleterious substance by the reference crude rate of the refinery for that month.

III. EFFLUENT DISCHARGE CRITERIA AND LIMITATIONS - EFFLUENTS FROM PETROLEUM REFINERIES (CONT)

d) For the purpose of 2.a)iii) the authorized deposit for a refinery of a deleterious substance prescribed in A.2 through 6 shall, subject to e), be calculated by multiplying the amount set out in column IV of an item of Schedule I for the deleterious substance by the reference crude rate of the refinery for that month.

e) Storm water effect

i) When storm water is deposited by a refinery in any day, the authorized deposit for the refinery of a deleterious substance prescribed in A.2, 3, or 6 calculated in accordance with sections a) and c) may be increased for that day by the amount set out in column II of an item of Schedule II for the deleterious substance for each 10,000 Canadian gallons of storm water that is deposited.

ii) The limit of the deposit authorized in pounds per month of a deleterious substance prescribed in paragraph 4a), b) or e) contained in storm water being deposited by a refinery in any month shall be calculated by multiplying the amount set out in Column III of an item of Schedule II for the deleterious substance by the reference crude rate of the refinery for that month.

5. Calculation of Actual Deposits

The monitoring, measurements, tests, calculations and reporting with regard to actual deposits of a deleterious substance in A.1 through A.6 shall be performed in accordance with methods and procedures [herein].

III. EFFLUENT DISCHARGE CRITERIA AND LIMITATIONS - EFFLUENTS FROM PETROLEUM REFINERIES (CONT)

6. Schedules for Authorized Deposits Calculations

SCHEDULE I

Amounts to be Used in Calculating Authorized Deposits of Deleterious Substances

Column I Name of Deleterious Substance	Column II Monthly amount in pounds per 1,000 barrels of crude oil	Column III One day amount in pounds per 1,000 barrels of crude oil	Column IV Maximum daily amount in pounds per 1,000 barrels of crude oil
Oil and Grease	3.0	5.5	7.5
Phenols	0.3	0.55	0.75
Sulfide	0.1	0.3	0.5
Ammonia Nitrogen	3.6	5.7	7.2
Total Suspended Matter	7.2	12.0	15.0

SCHEDULE II

Amounts to be used in Calculating Additional Authorized Deposits of Deleterious Substances When Storm Water is Being Discharged and Limits of Deposits Authorized

Column I Name of Deleterious Substance	Column III Pounds per 10,000 10,000 Canadian Gallons of Storm Water	Column III Pounds per month per 1,000 barrels of crude oil per day
Oil and Grease	1.0	25.0
Phenols	0.1	2.5
Total Suspended Matter	3.0	75.0

III. EFFLUENT DISCHARGE CRITERIA AND LIMITATIONS - EFFLUENTS FROM PETROLEUM REFINERIES (CONT)

D. Guidelines Respecting Acute toxicity of Liquid Effluents

1. Definitions

   a) "Bioassay Sample" means the liquid in the test vessels in which test fish are exposed during bioassay testing procedures and which has been formulated in accordance with procedures [herein].

   b) "Effluent Sample" means the contents of a receptacle into which representative portions of liquid effluent or once-through cooling water from a refinery are delivered manually or by a sampling device in accordance with [Schedule III herein].

   c) When storm water is deemed not to be storm water for the purpose of the Petroleum Refinery Liquid Effluent Regulations, it is deemed not to be storm water for the purpose of these Guidelines.

2. Applicability

   This subsection D. is applicable to the owner of a refinery during any period in which the refinery is depositing any substance listed in III. A. herein. The reporting requirements are to be met after the end of any month during which such deposits were made.

3. Specific Standards

   a) For the purpose of these Guidelines, refinery liquid effluent and once-through cooling water that is deposited is not acceptable if more than 50% of the fish die in the bioassay sample, when tested according to the bioassay procedure set out [herein in Schedule I]. This is the "96 Hour Flow-through Bioassay Procedure."

   b) Dilution of liquid effluent or once-through cooling water at a refinery primarily for the purpose of meeting the objective set out in a) should not be carried out.

   c) The owner of a refinery is also requested to determine once a month or as requested by the Minister the acute toxicity of liquid effluent and once-through cooling water being deposited

III. EFFLUENT DISCHARGE CRITERIA AND LIMITATIONS - EFFLUENTS FROM PETROLEUM REFINERIES (CONT)

by the refinery by carrying out tests and observations in accordance with [Schedule II herein].

d) For the purpose of c) if the owner of a refinery is unable to obtain suitable fish stocks for the testing set out therein it need not be carried out.

4. Reporting Requirements

The owner of a refinery to which this subsection D is applicable in any month is requested to sign, date and forward to the Minister promptly after the end of that month a report in such form as the Minister may prescribe, indicating:

a) The reference crude rate for that refinery at the time of sampling.

b) The flow rates at the time the effluent sample was taken for each liquid effluent and once-through cooling water stream.

c) The flow rate of storm water, if any, contained in liquid effluent at the time the effluent sample was taken.

d) The quantity and percentage of diluent added to the effluent sample.

e) The bioassay procedure used in determining the acute toxicity of liquid effluent and once-through cooling water.

f) The number of dead fish observed in the test and control vessels for the exposure times outlined in the bioassay procedure used.

g) Any other information the owner may feel is useful in interpreting the results of the test.

IV. CRITERIA FOR WASTEWATER TREATMENT

A. Federal Establishments

1. Minimum Treatment Guidelines

Generally, secondary treatment or equivalent should be the minimum acceptable treatment, provided that

IV. CRITERIA FOR WASTEWATER TREATMENT (CONT)

the effluent produced meets the effluent guidelines specified. Treatment systems (properly designed, operated and maintained) that are capable of meeting these requirements include activated sludge plants, trickling filters, rotating biological contactors, independent physical-chemical plants, and two-cell lagoon systems. Two-cell lagoon systems should be designed with a minimum of annual retention (longer retention periods where climatic extremes warrant). Discharge should be made once per year, during the spring. Procedures for discharging can be obtained from local E.P.S. offices. Land disposal systems such as one-celled total retention lagoons or spray irrigation should be considered acceptable provided soil, groundwater and climatic conditions are satisfactory. In spray irrigation systems, the irrigation water, as a minimum requirement, should meet the effluent quality limits specified herein with the exception of spray irrigation of food crops, orchards, pasture lands or recreational areas when more stringent limits on irrigation water are necessitated because of a public health risk.

Holding tanks should be considered acceptable provided their operation constitutes no threat to public health or impairs aesthetic conditions of the site at which they are utilized. The contents of such holding tanks should be disposed of on a regular basis in accordance with the requirements and limits outlined in these guidelines. Septic tanks or Imhoff tanks discharging directly to surface waters are not considered acceptable.

2. Disinfection Guidelines

The discharge of a chlorinated effluent from a Federal establishment to a receiving stream may, in some instances, prove hazardous to the habitat and life of fish and shellfish native to that body of water. Such being the case, as determined by the local Environmental Protection Service office, several alternative solutions are available which depend on each particular situation. These include:

a) Discharge of an effluent with no disinfection where it is proved beyond reasonable doubt that there is no threat to public health.

b) Utilization of an alternate non-toxic disinfectant or method of disinfection.

IV. CRITERIA FOR WASTEWATER TREATMENT (CONT)

c) Utilization of dechlorination units prior to the discharge of a chlorinated effluent.

3. Treatment and Disposal of Sludge.

The discharge of untreated sewage sludge to the environment should not be considered an acceptable practice. Untreated sewage sludge includes raw sludge removed from septic tanks and holding tanks, as well as unprocessed sludge removed from wastewater treatment systems indicated elsewhere herein. Treated sludge should not be discharged into receiving waters or treatment plant effluents. Ocean dumping of treated sludge should not be permitted.

Processes involving the treatment and disposal of sludge should reflect the best practicable technology available, as well as integrate uniformly into wastewater treatment systems.

4. Advanced Wastewater Treatment Requirements.

Technology is available which will permit the installation of advanced wastewater treatment systems when an effluent quality higher than the minimum specified herein is desired. Locations for such installations shall be based on the need for maintaining or enhancing receiving water quality in environmentally sensitive areas.

5. Discharges to Shellfish, Water Supply Areas or Recreational Waters - Guidelines.

Discharges in close proximity to shellfish beds, public water supply areas or contact recreation areas should be avoided. Where such discharges are unavoidable, the following items are recommended and may be required in addition to other measures for reliability.

a) Dual disinfection units;

b) Automatic facilities to regulate and record residuals;

c) Automatic alarm systems to give warning of high water, power failure, or equipment malfunction;

d) Advanced wastewater treatment units;

e) Seasonal discharge.

IV. CRITERIA FOR WASTEWATER TREATMENT (CONT)

6. Pretreatment.

In cases where it is judged that the discharge of an effluent from a Federal establishment may cause fire or explosion or be injurious in any other way to a collection or treatment facility, or cause the violation of applicable effluent or receiving water standards, pretreatment or prohibition of the discharge of such materials to the sewer system may be required.

7. Discharge to Municipal Systems.

The use of municipal facilities for treatment and disposal of effluents from Federal establishments shall be encouraged provided such arrangements are economically feasible and the municipality itself complies with Federal and Provincial regulations or intends to do so within a reasonable time frame. In cases where municipal systems are inadequate, pretreatment of wastewater may be required.

V. RECEIVING WATER QUALITY CRITERIA

A. General Receiving Water Quality Objectives Promulgated by the Federal Government for the Yukon and Northwest Territories

1. These general water quality objectives will give over-all guidance to water managers for ensuring that, regardless of the utilization or development of the water resource, reasonable measures will be taken to protect water quality.

2. Every effort should be made to retain the natural quality of territorial waters. Should, however, it be deemed necessary to allow degradation to occur for socio-economic, or other reasons, then all reasonable and practicable measures should be employed to ensure that the loss in quality does not exceed the minimum levels required to protect the most sensitive use.

3. Territorial waters deemed to have outstanding natural recreational and aesthetic value should be maintained in their natural state.

4. To ensure that the quality and over-all value of territorial waters are protected and enhanced, water pollution control programs should ensure that:

V. RECEIVING WATER QUALITY CRITERIA (CONT)

a) The quality of any body of water and the life-system functioning within that water body should not be allowed to deteriorate below minimum acceptable levels consistent with current knowledge and practicable technology, or, if below, should be brought up to a minimum acceptable quality;

b) Certain "high quality" bodies of water whose existing quality is substantially above existing requirements, should be maintained at their existing high quality levels.

c) Where natural conditions are suitable, all bodies of water should be sufficiently high quality to permit safe direct body contact.

d) All waters should meet minimum national or international standards and objectives (statutory, recommended, or agreed) designed for the protection or enhancement of public health and well-being.

e) The quality of waters should be maintained so as not to impede optimum sustainable economic yield of Canada's fishery resources compatible with other desired uses of water.

f) All waters should be maintained free from, or within concentration limits designated under appropriate legislation respecting environmental contaminants or conditions, any substances which pose a threat to the aquatic or human environment. Such freedom or limitation should be corroborated by biological assessment.

g) All waters should be free from amounts of substances attributable to municipal, industrial and other discharges that will settle to form putrescent or otherwise objectionable desposits, that produce colour, odour and other conditions, in such a degree as to create a nuisance or in concentrations that are toxic or harmful to human, animal or aquatic life.

h) All waters should be free from floating debris, oil, scum and other floating materials attributable to municipal, industrial or other discharges (including

V. RECEIVING WATER QUALITY CRITERIA (CONT)

those from ships and other water-borne vehicles) in amounts sufficient to cause unsightly or deleterious effects on water quality.

i) All waters should be free from nutrient substances derived from municipal, industrial, agricultural or other sources in concentrations or quantities that create nuisance growths of aquatic plants and algae.

VI. WATER QUALITY CRITERIA FOR SPECIFIC USES OR SUPPLY

A. In several guideline codes the Canadian Federal government has incorporated criteria for specific water uses which cannot be directly compared to the receiving water or effluent criteria summarized in this synopsis. However, these water use criteria may eventually be the basis for receiving water standards which in turn control the levels at which effluent standards are set. The major categories or areas in which these Canadian water use criteria fall are:

1. Public Water Supply
2. Aesthetics and Recreation
3. Aquatic Life and Wildlife
4. Agricultural Water Supply
5. Industrial Water Supply

B. A further break-down showing representative specific subjects included in Canadian criteria tables within a few of the above 5 general categories follows:

1. Agricultural

   Water Quality Criteria for Irrigation Waters

   Water Quality and Body Burden Criteria for Livestock

2. Aquatic Life and Wildlife

   Guidelines Defining Various Levels of Protection from Harmful Factors for Aquatic Ecosystems

   Temperature Guidelines for Fish and Other Aquatic Organisms

VI. WATER QUALITY CRITERIA FOR SPECIFIC USES OR SUPPLY (CONT)

Finely Divided Solids Guidelines for Harmful Effects on Aquatic Organisms

Salinity Guidelines for Freshwater and Estuarian Aquatic Organisms

3. Aesthetics and Recreation -

*a) Water Quality Guidelines for Direct Contact Recreation

4. Industrial -

a) Industrial Water Quality Requirements at Point of Use of Cooling, Heating and Steam Generation

b) Industrial Water Quality Requirements at Point of Use for Chemical and Allied Industries

c) Industrial Water Quality Requirements at Point of Use for Miscellaneous Industries

d) Water Quality Criteria for Food Processing

e) Water Quality Criteria for Brewing and Soft Drinks

f) Water Quality Criteria for Leather and Tanning and Finishing

g) Water Quality for Boiler Feed Water

*h) Water Quality Criteria for Cooling Water

*i) Water Quality Criteria for the Petroleum Industry

j) Water Quality Criteria for the Mining Industry

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*Tables included in C. below

VI. WATER QUALITY CRITERIA FOR SPECIFIC USES OR SUPPLY (CONT)

C. For reference only several of the tables listed in B. are included below. These criteria are not comparable to and therefore not included in the summary of most stringent standards and criteria.

1. Water Quality Guidelines for Direct Contact Recreation (swimming, bathing, wading, water skiing):

No.	Parameter	Objective	Maximum Permissible Limit
1.	Total Coliform Organisms (Median MPN)	<100	500
2.	Fecal Coliform Organisms (Median MPN)	< 20	200
3.	Turbidity (Jackson Unit)	< 5	50
4.	Secchi Disc Visibility (minimum)	20 F (6 m)	4 F (1.2 m)
5.	pH, units	6.5 - 8.3	>6; >9
6.	Temperature	No increase over natural	30°C. (85°F.)
7.	Total Plankton Concentration (Biomass)	No increase (over normal level) by induced growth.	Not more than 5,000 org/l over normal level
8.	Colour (Pt-Co Scale)	<15	100
9.	Odour (T.O.N.)	Inoffensive	16
10.	Ether Extractible Oils & Grease (mg/l)	No noticeable oil slicks or floating grease	5 mg/l
11.	Synthetic Detergents	Less than foam-threshold (usually <0.5 mg/l as ABS-equiv.)	2 mg/l as ABS-equiv.
12.	Toxic Substances	Drinking Water Quality Standards	Not to exceed s emergency limit for toxicants
13.	Gross Radioactivity	None	<10 pc/l

VI. WATER QUALITY CRITERIA FOR SPECIFIC USES OR SUPPLY (CONT)

2. Water Quality Criteria for Cooling Water:

Substance	Units	Concentration
Hardness (CaCO)	mg/L	50
Iron	mg/L	0.5
Manganese	mg/L	0.5
Turbidity	J.T.U.	50

Water should not deposit scale, be corrosive nor encourage the growth of slime.

3. Water Quality Criteria for Petroleum Industry:

Substance	Units	Concentration
Calcium	mg/L	75
Chloride	mg/L	200
Dissolved Solids	mg/L	750
Hardness (CaCO)	mg/L	350
Hardness, non-carbonate	mg/L	70
Iron	mg/L	1.0
Magnesium	mg/L	25
pH	Units	6.0 - 9.0
Suspended Solids	mg/L	10

CANADA-FEDERAL: AIR REGULATIONS NEW SOURCES

Agencies: Environmental Protection Service-
Air Pollution Control Directorate
(Branch of Environment Canada),
Department of National Health and Welfare,
Atmospheric Environment Service,
(Branch of Fisheries and Environment Canada)

I. GENERAL

A. Definitions

1. "Act" means the Clean Air Act of Canada.

2. "Air contaminant" means a solid, liquid, gas or odour or a combination of any of them that, if emitted into the ambient air, would create or contribute to the creation of air pollution.

3. "Ambient air" means the atmosphere surrounding the earth, but does not include the atmosphere within a structure or within any underground space.

4. "Arctic mining" refers to the mining, crushing, concentrating, concentrate drying and associated operations for the recovery of minerals or metal concentrates other than the quarrying of sand, gravel and aggregates or the mining and milling of asbestos carried out in the Yukon or the Northwest Territories.

5. "Ary" means a measurement that does not include uncombined water vapour.

6. "Metallurgical coke" means the total solid carbonaceous residue, produced from the destructive distillation of coal, obtained by the by-product process.

7. "Metallurgical coke manufacturing plant" means a plant or any part thereof in which coal is processed into metallurgical coke suitable for blast furnace or foundry or other metallurgical process use.

8. "Minister" means the Minister of the Environment.

I. GENERAL (CONTD.)

9. "Opacity" means the degree to which emissions reduce the transmission of light and obscure an object in the background.

10. "Particulate matter" means any finely divided liquid or solid material other than water droplets.

11. "Prescribed" means prescribed by regulation.

12. "Stationary source" means any source of emission of one or more air contaminants other than a motor vehicle, ship, train or aircraft. Note that the U.S. E.P.A. regards a ship in drydock as a stationary source.

13. "Undiluted" means that gaseous diluents have not been used to conceal an emission or to achieve compliance with this guideline.

B. General Provisions

1. The guidelines herein for particulate matter and SO_2 for the metallurgical coke manufacturing industry have been developed in consultation with representatives of provincial governments and of that industry and are based on best practicable technology currently available to the metallurgical coke manufacturing industry to control emissions of particulate matter and sulphur dioxide to the ambient air. If implemented on a national basis, particulate and sulphur dioxide emissions from metallurgical coke manufacturing plants would be reduced by 70% Existing plants may require additional time to implement the guidelines herein suggested.

   The Minister of the Environment anticipates that provincial air pollution control agencies may wish to adopt these guidelines as minimum standards for metallurgical coke manufacturing plants located within their jurisdiction. However, local conditions such as density of industrial development or topography may necessitate the adoption of more stringent requirements than those suggested in these guidelines in some areas.

2. The guidelines herein for particulate matter, sulphur dioxide, and opacity for the arctic mining industry have been developed in consulta-

tion with representatives of territorial governments, of the arctic mining industry and of the Department of Indian and Northern Affairs, and are based on best practicable technology currently available to the arctic mining industry to control emissions to the ambient air. If implemented, particulate matter emissions from arctic mining plants would be reduced by 80 percent. The U.S. Environmental Protection Agency has no regulations for the Arctic Mining Industry.

The territorial governments have indicated agreement in principle to adopt the guidelines as minimum standards for arctic mining plants located within their jurisdiction. Local conditions, such as topography, may necessitate the adoption of more stringent requirements than those suggested in these guidelines in some areas.

3. Notes on Canadian Federal Air Regulations and Federal-Provinces relationship as to air pollution control in Canada:

   Canada is a federal state with the provinces being similar to states of the United States. Canada passed its Clean Air Act in 1971 and most of the provinces have their own legislation in this area, some having created it before 1971. Both federal and provincial governments are empowered to make a variety of laws and regulations relating to environmental matters. Compared with the United States system, as evolved, the Canadian provinces have thus far developed their own environmental regulations more independently than the states in the U.S., with many less mandatory requirements placed on the provinces by the Canadian federal government or its Clean Air Act.

   The Canadian federal government has potential regulatory authority in its legislation than actually used thus far, and may be expected to increase its involvement. The federal Clean Air Act authorizes the Canadian government, among other things, to:

   a) Coordinate a national program of air pollution surveillance in Canada;
   b) Establish National Air Quality Objectives or targets for air quality;

c) Establish regulations for air pollution control including the setting of emission standards for point sources of air pollution (these standards may be enforced by federal, provincial, or local control agencies); and
d) Promulgate national "guidelines" for recommended emission limits, which are not immediately enforceable by law, but may become so if the necessity arises.

The federal guidelines and regulations are developed with the assistance of industry and provincial governments through a government-industry task force. Point source air pollution containment is stressed and generally based on best practicable or best available technology. The national emission guidelines, developed to provide the basis for minimum controls across Canada, have been adopted as emission standards by some of the provinces.

Where air contaminants are being emitted that would constitute a significant danger to human health, national emissions standards may be prescribed directly by the federal government as regulations enforceable by legislation.

Federal guidelines have been published for emissions to the air from the cement, asphalt paving, coke oven, and arctic mining industries. Guidelines for incineration, natural gas processing, and petroleum refining are nearing completion, while those for other industries are in development. Federal regulations are at present in effect for limiting the quantities of lead from secondary lead smelters and regulations limiting asbestos from asbestos mining and milling operations, mercury from chlor-alkali plants, and requiring information on the composition of fuel and fuel additives will come into effect in 1978. Federal regulations controlling emissions of vinyl chloride and arsenic are also under development.

The U.S. Environmental Protection Agency has new source regulations for 27 industrial categories, as well as standards for asbestos, mercury, beryllium and vinyl chloride. These regulations could serve as a resource to the Canadian Federal Government in the development of their standards and regulations.

II. EMISSION STANDARDS FOR PARTICULATE MATTER AND OPACITY STANDARDS

A. Metallurgical Coke Manufacturing Industry (Limitations in this subsection were issued as "national guidelines.") Maximum emission rates:

1. Charging operation
   0.20 lbs/short ton of dry coke produced

2. Pushing operation
   0.020 gr/SCF, dry and undiluted, gaseous downstream of gas cleaning equipment.

3. Quenching operation
   0.10 lb/short ton of dry coke produced

4. Coal and coke crushing and screening operations
   0.020 gr/SCF, dry and undiluted, exhaust gases downstream of gas cleaning equipment.

5. Exhaust Gases from Battery Stack(s)
   0.030 gr/SCF, dry and undiluted.

6. Exception to subsections A.1-A.5. above:
   Guidelines suggested may be exceeded in the event of a malfunction or breakdown in air pollution equipment associated with the process equipment, but such events should be minimized, both as to frequency and duration of each occurence.

B. Arctic Mining Industry ("national guidleines")

1. Maximum Opacity
   20%

2. Particulate Matter - maximum emissions
   0.017 gr/SCF, dry and undiluted,
   from an arctic mining plant

3. Waiver of compliance requirement.
   Upon written application, a waiver from the limitations of subsection B. may be granted by the agency, which shall take into account the following factors in considering approval:
   a) submission and approval of a schedule of compliance;

II. EMISSION STANDARDS FOR PARTICULATE MATTER AND OPACITY STANDARDS (CONTD.)

b) the nature and characteristics of the plant process and the plant size;
c) the plant operating, maintenance and housekeeping practices;
d) the performance specifications of the air pollution control equipment which
  i) has been installed and is in operation,
  ii) is being installed,
  iii) is in the planning stages for installation.

III. EMISSION STANDARDS FOR SO_2

A. Metallurgical Coke Manufacturing Industry (Limitations in this subsection were issued as "national guidelines")

1. Maximum emission rate from combustion of coke oven gas.
   2.60 lb/short ton (this limitation is equivalent to an H_2S content in the coke oven gas of 50 gr/100 SCF coke oven gas)

B. Arctic Mining Industry ("national guidelines")

1. Maximum emission rate from combustion of fuel oil used in drying concentrates.
   0.61 lb/MM Btu

IV. LIMITATIONS ON OTHER CONTAMINANTS BY INDUSTRIAL SOURCE CATEGORIES

(As directly applicable standards are limited, the following regulations are included as references, and to aid in showing the nature and scope of the Canadian-Federal Air Regulations)

A. Maximum Mercury Emissions from Chlor-Alkali Plants

1. Applicability. For this subsection chlor-alkali plant means any facility or combination of facilities, located at an industrial site, designed or operated for the production of chlorine and alkali metal hydroxides by means of any industrial process involving the electrolysis of brine using one or more mercury cells, and

IV. LIMITATIONS ON OTHER CONTAMINANTS BY INDUSTRIAL SOURCE CATEGORIES (CONTD.)

includes any ancillary equipment that is used for the further concentration of the alkali metal hydroxide produced and any properties used for the operation of the facilities.

2. Ventilation gases exhausted from cell rooms;
   5 g/day/1000 Kg rated capacity

3. In hydrogen gas stream from denuders:
   0.1 g/day/1000 Kg rated capacity

4. In gases exhausted from retorts:
   0.1 g/day/100 Kg rated capacity

5. Tanks. No mercury shall be emitted directly into the ambient air from a tank.

6. The total amount of mercury emitted by a plant from sources specified in A.2-A.5. above shall not exceed 1.68 Kg/day. Note that this limitation is stricter than the U.S. Environmental Protection Agency regulation (40CFR Part 61, Subpart E), which allows not more than 2.3 kg/24 hrs of mercury to be emitted from chlor-alkali plants. From sewage sludge incinerators, the U.S. Environmental Protection Agency standard calls for an emission "not to exceed 3200 g/24 hrs of mercury."

B. Maximum Asbestos Emissions from Asbestos Mining and Milling Operations.

1. In gases emitted at a mine or mill from crushing, drying or milling operations as from dry rock storage
   2 asbestos fibres/cubic centimeter of gases, dry and undiluted. The U.S. Environmental Protection Agency has no similar standard.

C. Should a province have any more stringent regulation or standard than those in A. and B. above, such more stringent requirement would apply within the territory of that province.

D. [The Canadian Federal government also has anti-pollution regulations pertaining to metallurgical industries which require periodic reporting of information relating to emissions of arsenic and mercury from affected facilities in these industries. Similarly, other regulations require regular reporting of certain information, including the chemical or elemental composition of fuels by producers or importers of fuels over a certain quantity.]

CANADA - FEDERAL: SOLID WASTE REGULATIONS - NEW SOURCES

Agencies: Environmental Protection Service (E.P.S.) -
Environmental Impact Control Directorate
(Branch of Fisheries and Environment Canada)

I. GENERAL

A. Definitions

1. "Ashes" means residue from burning of any combustible material.

2. "Cover material" is soil or other suitable material that is used to cover compacted solid waste in a land disposal site.

3. "Disposal" means the final treatment, discharge or placement of solid wastes in a manner which results in minimal or no impact on the environment.

4. "Hazardous and toxic waste" means any product or substance that is or contains a poisonous, toxic, inflammable, explosive or corrosive product or substance of similar nature, which upon release or escape to the environment may cause or may contribute to a harmful effect on the environment, and on human health and safety. It covers chemical, toxic, hazardous, pathological and similar gaseous, liquid and solid wastes, but excludes gaseous, liquid and solid municipal wastes, radioactive materials, non-toxic and non-hazardous commercial and industrial solid wastes, construction debris, and similar wastes.

5. "Incineration" means a combustion process to reduce the weight and volume of a waste on a controlled basis. Products of this process may include non-combustible gases and solid residues containing little or no combustible material.

6. "Industrial solid wastes" means all solid wastes which result from industrial processes and manufacturing operations such as food processing, factories, processing plants, repair and cleaning establishments, refineries and rendering plants.

7. "Primary collection" is the act of removing wastes from the point of generation to the storage area.

I. GENERAL (CONTD.)

8. "Processing of wastes" means any technology applied for the purpose of reducing the bulk of solid waste materials or any technology designed to convert part or all of the waste materials for reuse. Processing of wastes generally produces a change in physical characteristics.

9. "Putrescible" means solid waste capable of being decomposed by micro-organisms with sufficient rapidity to cause nuisances from odours and gases, such as kitchen wastes, offal and carcasses.

10. "Refuse" is a mixing of garbage and rubbish (putrescible and non-putrescible wastes), with a moisture content of about 35 to 50 percent and a gross heat value of 4000 - 6000 Btu/lb.

11. "Rubbish" means non-putrescible solid waste. Includes ashes of both combustible and non-combustible wastes, such as paper, cardboard tin cans, yard clippings, wood, glass, bedding crockery, or litter of any kind.

12. "Secondary collection" means the act of removing solid wastes from the central storage point of a primary source.

13. "Solid waste handling" means the purposeful systematic control of the collection, processing, storage and transport of solid wastes.

14. "Waste management" - management refers to all aspects of the establishment and operation of a system for safe and efficient control of wastes.

B. Applicability

These guidelines and standards shall apply to Federal facilities under the jurisdiction of the Federal Government.

All solid wastes generated at Federal facilities should be handled in compliance with this code and with applicable municipal, provincial and Federal regulations or requirements. The highest standard should always be followed.

I. GENERAL (CONTD.)

C. General Provisions and Objectives.

1. A waste handling system includes an organization which provides for the orderly, systematic and efficient control of generation, collection, processing, storage and transportation of solid wastes. This control requires the involvement of qualified personnel in all phases of management.

   Handling procedures for solid waste should reflect the variety of substances at each individual facility and the disposal methods available.

2. Objectives

   The objectives of solid waste management systems are:

   a) The reduction of waste generation within Federal facilities. The quantities of solid wastes generated at a facility can be reduced at two activity levels: purchasing and use. Therefore, the availability and type of disposal method should be a primary factor in the determination of purchasing policies. Similarly, improvements to user habits can reduce the generation of solid waste. Management should review procedures which generate solid waste to determine where improvements can be made.

   b) The attainment of maximum safety, efficiency and economy in the collection, processing, storage, and transportation of solid wastes. The use of standard receptacles, containers, collection vehicles, processing equipment and work procedures will improve the economy and safety of solid waste handling. Waste handling personnel should be trained and fully qualified in the use of waste handling equipment, and in lifting and carrying heavy or bulky objects. They should wear suitable clothing, perferably uniforms, that will not become entangled in equipment which they operate in the course of their duties. The hazards inherent in handling solid waste result in a high rate of accidental injury. Treasury Board has established the safety

I. GENERAL (CONTD.)

requirements governing Federal government departments and the responsibility for monitoring departmental compliance with these safety standards is assigned to the Canada Department of Labour. Management should consult with the Canada Department of Labour concerning these safety requirements and develop safety and training programs to assist in reducing accident frequency. The safety requirements mentioned above for any employee of a Federal government department are specified in the Treasury Board Standards Respecting Materials Handling and Personal Protective Clothing in Section 2 of the booklet "Occupational Health and Safety." Personnel who have other duties in addition to waste handling, particularly food preparation, should be required to wash after handling wastes or waste containers. The requirements of the Department of National Health and Welfare with respect to personnel protection should be adhered to by all individuals. Cleanliness is essential in every phase of waste management.

c) The recovery, where feasible and practical, of recyclable materials from solid wastes. Where quantities of recyclable waste and local market conditions indicate the feasibility of recycling, handling procedures should be adapted to meet this requirement.

d) The establishment and maintenance of an interface between each Federal facility and the public or private waste disposal agency. Waste handling personnel may be under the direct supervision of the waste handling manager or they may be employed by concessionaires or cleaning and maintenance contractors. In either case, personnel should be required to comply with the requirements of this code.

e) The observance of protective measures to minimize the adverse effects of solid waste generation on the ecology.

f) Solid wastes may be classified as shown (herein) by category, composition, and source.

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g) This code will be revised and amended from time to time to reflect new developments in technology and/or changing circumstances.

II. SOLID WASTE SYSTEM MANAGEMENT - PRIMARY COLLECTION, PROCESSING, AND DISPOSAL

A. Primary Collection

Each facility is responsible for the waste it produces until it has been disposed of in an approved manner. The method used to prepare waste for collection is a significant aspect in maintaining an effective and efficient operation from the point of generation through to final disposal.

Primary collection is the removal of solid wastes from points of generation to one or more storage areas within the facility. A solid waste management system will establish:

1. Types, sizes and locations of the various waste receptacles required.
2. Segregation and preparation of wastes, if feasible, for recycling or disposal.
3. Frequency of collection.
4. Collection resource requirements (conveyances and manpower).

B. Processing

Processing reduces the volume, facilitates handling and can lower the cost of storage, secondary collection, transportation and disposal. Evaluation of processing techniques should be conducted in consideration that the ultimate disposal of some portion or all of the solid waste generated will be sanitary landfill. Processing methods should be selected to be compatible with all other phases of the waste handling system.

Depending on building layouts, processing may be most economical either at points of generation or in waste storage areas. For example, kitchen wastes should be de-watered in the kitchen area before being deposited

II. SOLID WASTE SYSTEM MANAGEMENT - PRIMARY COLLECTION, PROCESSING, AND DISPOSAL (CONT)

in receptacles. An alternative processing method is wet grinding. The discharge of ground garbage into the sanitary sewers should not be permitted unless it can be shown that the added organic and hydraulic loads will have no detrimental effects on the sewage system. Local codes must also be reviewed to determine whether or not the practice is permitted. The advantages of wet grinding to the solid waste handling system must be weighed against the disadvantages to the sewage system.

Where rubbish is transported to storage areas by gravity chutes and/or conveyors, processing equipment should be located in the storage areas. The processing equipment may be a baler, grinder, hogger, pulper, pulverizer or shredder as described in Section 4.

Processing equipment should be arranged to discharge directly into bulk containers where possible. This will minimize handling of wastes by personnel.

C. Disposal

Disposal is considered herein as the final treatment or combination of treatments in the conversion of wastes to innocuous materials or useable by-products. Generally, known disposal methods are limited to relatively few conversion processes, some involving conversion by normal decomposition of materials and several processes which involve accelerated conversion.

Conversion of waste may be accelerated by destructive disposal processes such as controlled incineration. Conversion may also be accomplished by natural composting or accelerated by means of various mechanized systems. Grinding of domestic and commercial food wastes for discharge to sewers with ultimate processing at treatment plants and final disposal of sludge at sanitary landfills or other disposition is accepted in many areas as a disposal method for garbage. In addition, other terminal processes such as wet air oxidation and pyrolysis are among the newer accelerated conversion processes being explored. Reclamation of selected waste materials, rendering of animal

II. SOLID WASTE SYSTEM MANAGEMENT - PRIMARY COLLECTION, PROCESSING, AND DISPOSAL (CONT)

carcasses and fats for production of glues, fertilizers and soaps, as well as salvage of food wastes for swine feeding, are representative of the accelerated conversion processes by salvage. Disposal by sanitary landfill, is the only acceptable process where conversion is not normally accelerated by man, where normal bacteriological decomposition of material occurs.

It should also be noted that some form of land disposal will ultimately be required for disposal irrespective of the processing or treatment method utilized in order to handle residue and special wastes, and to provide a back-up system for mechanized disposal techniques which are subject to mechanical and labor problems.

Sanitary landfill sites and practices should be thoroughly examined before entering into an agreement with a disposal agency, and an annual review of practices should be carried out.

The major factors which should be considered in evaluating a sanitary landfill site are:

1. Site selection and preparation
2. Equipment
3. Operating and monitoring procedures
4. Costs

Site selection should be evaluated in terms of public health and safety, location, accessibility, local zoning regulations and potential for causing environmental damage from gas migration and leachate movement. Special requirements such as climate, terrain, proximity to airfields and ultimate use of a completed site should be included in the overall assessment. Site preparation should provide for an adquate engineering survey to establish access roads, drainage, soil and groundwater characteristics, equipment storage facilities, services and the availability of adequate cover.

II. SOLID WASTE SYSTEM MANAGEMENT - PRIMARY COLLECTION, PROCESSING, AND DISPOSAL (CONT)

Equipment should be evaluated to ensure that it is suited to the requirements of the operation. Size and type of equipment should be adequate to meet refuse compaction and daily cover material handling requirements.

Operating procedures should follow the practices recommended by the American Society for Civil Engineering in using either the area fill or trench fill techniques. Monitoring procedures for ensuring proper control of fire hazard, air and water pollution, pests, insects and other nuisances should be enforced.

Federal facilities should use provincially approved disposal services provided such disposal facilities and services conform to recommended practices as provided for in the "Guidelines on Sanitary Landfill at Federal Establishments" and the "Guidelines Applicable to Incinerators at Federal Establishments."

III. DESIGN CONSIDERATIONS FOR SOLID WASTE SYSTEMS

A. General Design Considerations

The designer of new or remodelled Federal facilities should prepare a comparative cost analysis of collection, waste processing, storage, transportation and disposal alternatives for consideration prior to final choice of methods to be employed. The design brief for new or remodelled Federal facilities should contain the following information relevant to solid waste handling:

1. Classification of solid wastes generated by the facility, either known or estimated.
2. Quantities of solid wastes generated by the facility, by type, either known or estimated.
3. Dimensions, weights, types and quantities of primary collection vehicles.
4. A review of availability of secondary collection, transportation and disposal facilities and an

III. DESIGN CONSIDERATIONS FOR SOLID WASTE SYSTEMS (CONT)

analysis of the adequacy of these for each waste type.

5. Annual costs of available types of bulk waste containers.

6. Annual cost of available methods of secondary collection, transportation and disposal of routine solid wastes.

IV. SPECIAL CONSIDERATIONS FOR NORTHERN CLIMATES, AND WORK CAMP FACILITIES.

Due to the problems peculiar to northern climates and isolated sites such as temporary work camps and wilderness recreation areas, a special section is included here describing recommended practices designed to reduce or overcome the effects of these problems.

A. Northern Climate Facilities

All Northern establishments should have a centralized, controlled waste handling system. Cold temperatures in northern climates require that equipment and facilities for the collection, storage, and transportation of solid waste be properly designed and maintained for use under extreme temperature conditions.

1. Primary Collection and Storage. Where applicable, separate containers must be provided for solid waste and human waste to ensure effective and safe collection of solid waste.

   In addition to meeting basic criteria for the types of solid waste described, containers and facilities for retaining containers prior to collection, should meet the following criteria:

   a) Able to withstand temperature extremes.
   b) Inaccessible to wild life.
   c) Unaffected functionally by freezing.
   d) Placed above ground (suspended from above or placed on platforms).
   e) Primary containers (i.e. garbage bags) should be made of biodegradable materials.
   f) Purchased in standard shapes and sizes.
   g) Inaccessible to scavengers.

III. DESIGN CONSIDERATIONS FOR SOLID WASTE SYSTEMS (CONT)

B. Work Camps

Solid waste management at work camps must be based on a pre-planned program and should be supervised by an individual familiar with the equipment and the difficulties associated with the extremes of both climate and terrain in northearn areas.

All procedures for collection, storage, treatment and disposal of solid waste must be considered and completely specified in the initial planning stage for each camp. Each work camp situation is different and no single method will be adequate for all situations.

Collection, storage, conveyance, and disposal operations at work camps should be carried out to ensure the following:

1. Environmental concerns are adequately considered.
2. Scavengers and insect vectors are not attracted to the camp refuse either prior to collection or at the ultimate disposal site.
3. Wind-blown trash is minimized.
4. No odour emission problems are produced by disposal or processing operations (open burning should not be permitted).
5. No public health hazards are created.
6. Restoration of the disposal site to original conditions upon closure of the camp. Transportation to disposal site should be carried out at least every two days. Transportation equipment should not litter the camp area and should be kept clean and free of refuse material.

V. HANDLING OF HAZARDOUS AND TOXIC SOLID WASTES

A. The handling of hazardous and toxic wastes generally is covered in the "Code of Good Practice for the Management of Hazardous and Toxic Wastes at Federal Establishments." The classification system therein

V. HANDLING OF HAZARDOUS AND TOXIC SOLID WASTES (CONTD.)

assigns each substance to one of nine handling groupings depending on the chemical and physical properties associated with that substance. For identification of chemical and physical properties in the classification of substances, information should be obtained from manufacturers relating to the following properties.

1. Flammability (flash point)
2. Reactivity (including explosiveness)
3. Combustion products
4. Toxicity
5. Toxicity of combustion products
6. Hazards associated with possible decay during storage
7. Environmental and health data relavant to the disposal of the particular substance.

Recovery or disposal/recovery methods for the various substances listed are indicated by number coding each substance to methods shown in tables also in that code.

B. Mixtures

The largest proportion of hazardous waste requiring disposal will be in the form of mixtures and in terms of quantity, the hazardous constituents will possibly be a very minor portion of the total volume. There is no means of predicting the combinations of hazardous and non-hazardous wastes that appear in different waste or waste streams and therefore the handling and disposal classification system and the procedures have to be given for the pure compounds. It is the responsibility of the originator of these wastes to determine the applicability of the procedures and to design specific procedures from these for his own operation. It should also be kept in mind that the presence of non-hazardous constituents may also greatly change the behaviour of trace hazardous constituents.

V. HANDLING OF HAZARDOUS AND TOXIC SOLID WASTES (CONTD.)

C. Poisonous Solids and Liquids

These are substances that destroy life or injure health when introduced into or absorbed by a living organism. They may be solids, liquids, or gases. Storage guidelines for gases are outlined [elsewhere herein].

Incompatible substances should not be stored together, but should be isolated from each other.

Some poisonous wastes also possess other hazards, such as a high fire hazard. When storing such double hazard wastes, reference should be made to the guidelines regarding storage of flammables and those regarding storage of poisons.

Special storage considerations. The following substances are known to have properties which require special consideration. The list may not be all-inclusive, and is subject to revision.

1. Hydrocyanic acid should be stored at temperatures below its boiling point of 26°C (79°F). Isolate from other storage and all possible sources of ignition. Individual containers should not be stored for periods longer than three months. Store in steel cylinders.

2. Methyl bromide should be stored in cylinders as recommended for the storage of gas.

3. Nitroaniline should be protected from moisture while stored.

4. Nitrobenzene should be stored at temperatures which will protect against freezing (MP = 5.7°C [42.5°F]).

5. Potassium or sodium cyanide releases highly flammable hydrogen cyanide gas on contact with acids or water, and should be stored away from such substances.

D. Flammable Solids

Flammable solids are of several types: dust or fine powders, those that ignite spontaneously at low

V. HANDLING OF HAZARDOUS AND TOXIC SOLID WASTES (CONTD.)

temperatures, those in which internal heat builds up on storage, and those with low ignition temperatures.

The degree of fire hazard usually increases as the size of solid particles decreases. Fine powders or dusts of flammable solids can form explosive mixtures in air. The degree of reactivity also increases as particle size decreases.

Containers. Metal cans or containers, constructed of material which will not react dangerously with or be decomposed by the solid, or suitable glass containers, should be used. Containers should be tightly closed.

Storage area. Storage areas should be located well away from areas of fire hazard. Bare filament heaters and other sources of ignition should be kept away from the storage area. All storage areas should be electrically grounded.

Prohibition of smoking in storage areas should be enforced with "No Smoking" signs posted in prominent places. Storage room should be equipped with automatic smoke or fire detection equipment. Ample fire-fighting equipment, compatible with the hazards present, should be readily available for emergency use. The storage area should be periodically inspected to ensure that good housekeeping practices are observed.

Flammable solids should not be stored near oxidizing materials, corrosives, or explosives. Some flammable solids have other hazards associated with their storage. These hazards should be noted, and extra care taken in the storage of such substances.

Special storage considerations. The following substances are known to have properties which merit special consideration. The list is not all-inclusive, and is subject to revision.

1. Phosphorous (white or yellow) should be stored under water or in an inert atmosphere. Red phosphorus should be stored in completely closed or hermetically sealed cans.

V. HANDLING OF HAZARDOUS AND TOXIC SOLID WASTES (CONTD.)

E. Chemical Landfill

Chemical landfilling of certain hazardous and toxic wastes may be an acceptable means of disposal. The design and construction of a fill site should only be contemplated after consultation with the regional office of the E.P.S. The following paragraphs include factors that should be considered in the design and operation of such a site.

1. Site selection. Site locations which are adjacent to heavily populated areas should be avoided. Sufficient distances should be provided between the facility and nearby industries or public roads and highways. The distances between residences and disposal areas should be a minimum of 153 meters (500 feet).

   The geological and groundwater conditions should be investigated through a program of field inspection and testing. The investigation should determine the depth and occurence of groundwater and its quality, and indicate either that geological conditions will prevent migration of hazardous material or that appropriate design features are feasible to prevent such migration.

   Leachate must not be allowed to reach groundwater sources. If the geological conditions are such that this may occur, impermeable materials may have to be imported or artificial linings installed. Pre-tests should be conducted to ensure that all liners are compatible with the materials for landfill. Recommended criteria for impermeable soils are:

   a) Fine-grained soils generally falling into group classification CL, CH or OH soils in accordance with Unified Soil Classification System.

   b) Permeability of 10^{-6} cm/sec. or less.

   c) Not less than 30% by weight passing the No. 200 sieve (U.S. Standard).

   d) Liquid limit of not less than 30 (ASTM test D423).

   e) Plasticity index of not less than 15 (ASTM test D424).

V. HANDLING OF HAZARDOUS AND TOXIC SOLID WASTES (CONTD.)

2. Drainage. All surface runoff from areas tributary to the disposal site should be diverted around the site. Drainage devices, such as culverts, to bypass storm runoff from disposal areas, should be adequately sized to carry the required flow capacity.

   Landfill surfaces should be properly sloped to prevent ponded water conditions. The top slope should be 2 to 4 percent to prevent erosion problems.

   If large quantities of wastes are disposed of at the site and leachate may be a problem, interceptor drains or special collection facilities at the lower end may have to be provided. This provision is necessary to recycle any leachate into upper portions of the disposal site, or to treat the leachate in another manner.

3. Mechanical mixing. Wastes should be mechanically mixed with the soil, thus utilizing the absorbent capacity of the soil and perhaps achieving some biological degradation of the wastes by soil micro-organisms. This can be done in two ways: the wastes may be spread over the soil in thin layers and periodically mixed into the soil, or they may be placed in a trench or small pit, followed by filling of the trench or pit with soil. It is necessary to leave a substantial buffer zone between the disposal area and the property boundary (minimum 91.44 meters (300 feet) to enable protective measures to be taken at a future time if necessary.

V. HANDLING OF HAZARDOUS AND TOXIC SOLID WASTES (CONTD.)

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XIX. ALBERTA WATER REGULATIONS - NEW SOURCES

Agencies: Division of Pollution Control and
Division of Standards and Approvals
(both of the Department of the
Environment)

I. GENERAL

A. Definitions

1. "Act" means the Clean Water Act.

2. "Contaminant" means:

   a) any solid, liquid, gas, odor or combination of any of them, or
   b) heat in water as a result of the use of water in an industrial plant and discharged from or by an industrial plant.

3. "Department" means the Department of the Environment

4. "Water Pollution" means: a) the presence in water of any water contaminant in excess of the permissible concentration prescribed by the regulations for that water contaminant, or b) a change of the temperature of water in contravention of the regulations.

5. "Minister" means the Minister of Environment.

B. General Prohibitions

1. No person shall, without the written permission of the Director of Standards and Approvals or the Director of Pollution Control, discharge, deposit, drain, release, cause or allow to be deposited upon the banks of or into any reservoir, surface water or watercourse any substance capable of changing the quality of the water or causing water contamination.

II. SPECIFIC WATER QUALITY AND EFFLUENT STANDARDS OR CRITERIA

A. Although Alberta has its own "Clean Water Act" and several sets of regulations which have been promulgated under the authority of that act, it enforces water pollution control primarily through a permitting system for industrial, municipal and other point sources.

II. SPECIFIC WATER QUALITY AND EFFLUENT STANDARDS OR CRITERIA (CONT)

Permits are issued on a case-by-case basis and although numerous internal guidelines for both receiving water quality and effluent contaminant limitations are utilized, no specific water standards have been published in the Alberta water regulations. Thus, no specific water standards or criteria were available to report here.

Telephone conversations with officials within the water permitting department did indicate that the water quality standards for receiving waters listed below are consistently applied although they are not published for general use and are used on a case-by-case basis.

pH (range)	6.5-9.5
Suspended solids	25 mg/l
COD	<500 ppm
BOD	no standard
Oil and grease	≤15 ppm

ALBERTA AIR REGULATIONS - NEW SOURCES

Agencies: Division of Pollution Control
and Division of Standards and Approvals
(both of the Department of the Environment)

I. GENERAL PROVISIONS

A. Definitions

1. "Act" means the Clean Air Act.
2. "Air contaminant" means any solid, liquid or gas or combination of any of them in the atmosphere resulting directly or indirectly from the activities of man.
3. "Air pollution" means the presence in the atmosphere of any air contaminant in excess of the permissible concentration prescribed in the regulations for that air contaminant, or the presence of any air contaminant having an offensive odor in the atmosphere, regardless of its concentration in the atmosphere.
4. "Authority" means the Environment Conservation Authority.
5. "Department" means the Department of the Environment.
6. "Director of Standards and Approvals" and "Director of Pollution Control" mean respectively the Director of the Division of Standards and Approvals of the Department of the Environment and Director of the Division of Pollution Control of the Department of the Environment.
7. "License" means a license to operate a plant, structure or thing issued by the Director of Standards and Approvals.
8. "Minister" means the Minister of the Environment.
9. "Permit" means a permit to construct a plant, structure or thing issued by the Director of Standards and Approvals.
10. "Particulates" means any material, except uncombined water, having definite physical boundaries at standard conditions.

I. GENERAL PROVISIONS (CONT)

11. "Stationary source of air pollution" means a plant, structure, building, facility or installation therein which emits or may emit any air contaminant.

B. General Prohibitions

1. The release of toxic air contaminants to the atmosphere is prohibited unless the written approval of the Director of Standards and Approvals has been obtained.
2. No person shall use any device which will or may dilute or otherwise conceal the concentration of particulates in an effluent stream.

II. VISIBLE EMISSION STANDARDS

A. Maximum Emissions

40% opacity, averaged over a period of 6 consecutive minutes (from any stationary source or any burning or other activity).

B. Alternate Standard

Notwithstanding subsection A. above, the maximum visible emissions permitted from startup or shutdown of plant processes or waste burners used only for burning wood waste, soot blowing or process purging, or rapping of electrostatic precipitators may exceed an opacity of 40%, for an aggregate period of not more than 6 minutes in any one hour.

C. Reading Method. An observer shall determine the opacity of visible emissions regulated herein by averaging 24 consecutive readings taken over a period of six consecutive minutes at fifteen second intervals.

D. Subsections A. and B. above do not apply with respect to:

1. Smoke generators used in the program for the certification of visible emission readers established under these regulations.

II. VISIBLE EMISSION STANDARDS (CONT)

2. Fires used in firefighting training under the direction or consent of a) a municipal fire department, b) the Provincial Fire Commissioner or his representative, or c) the Director under the Disaster Services Act or his representative, if the Director of Pollution Control is notified in advance of the training.

3. Fires used for warmth, comfort or recreational purposes inside dwellings and fires used for recreational purposes outside dwellings.

4. Fires used for community recreational events which have the prior approval of an officer of the municipality, appointed for that purpose.

5. Open fires for disposing of burnable debris or prohibited debris that are authorized under the Clean Act (General) Regulations.

6. Operations or activities specifically authorized in writing by the Director of Standards and Approvals for such period as he specifies.

7. Ground thawing, if materials producing dense smoke are not used.

III. EMISSION STANDARDS FOR PARTICULATE MATTER

A. Fuel Burning Equipment
(Includes solid and liquid fuels including coal, coke, hogged fuel, distillate and residual fuel oils but not refuse incineration.)

1. Maximum emissions

0.20 lb/1000 lb effluent adjusted to 50% excess air and with not more than 50% of this maximum to be retained on a 325 mesh screen.

B. Processes and Operations
(Includes processing of hydrocarbons and petroleum products, refuse incinerators with feed capacity greater than 500 lb/hr, coal processing plants as well as others listed below.)

- The manufacturing of cement.
- Rotary and other lime kilns.

III. EMISSION STANDARDS FOR PARTICULATE MATTER (CONT)

- Operations recovering, storing or handling chemicals.
- Steel manufacturing plants and foundries a) that are located in an urban area, or b) that are located anywhere in the province but which have a production capacity of greater than 10 tons per hour.
- Stationary asphalt plants.
- The manufacturing of chemicals and allied products.
- The manufacturing of commercial fertilizers.
- The manufacturing or processing of stone, clay, shale, mineral, glass and fiberglass products.
- The manufacturing of asphaltic roofing products.
- The manufacturing of pulp and paper products.
- Seed cleaning plants, feed mills, grain handling facilities, hay and forage drying plants and alfalfa dehydrating plants located in an urban area having a population of 50,000 or more.
- Rapeseed processing plants and flour mills.
- Wood processing and woodworking operations located in an urban area having a population of 50,000 or more.
- Wood waste burners located in an urban area.

1. Maximum emissions

0.20 lb/1000 lb of effluent, with not more than 50% of this maximum to be retained on a 325 mesh screen.

C. Small Incinerators and Certain Other Operations (Includes refuse incinerators with feed capacity less than 500 lb/hr as well as other processes and operations listed below.)

- Seed cleaning plants, feed mills, grain handling facilities, hay and forage drying plants and alfalfa dehydrating plants located in an urban area having a population of under 50,000 or in a rural area.
- Wood processing and woodworking operations located in an urban area having a population of under 50,000 or in a rural area.
- Wood waste burners located in a rural area.
- Steel manufacturing plants and foundries that are located in a rural area and that have a production capacity of less than 10 tons per hour.

III. EMISSION STANDARDS FOR PARTICULATE MATTER (CONT)

1. Maximum emissions

0.60 lb/1000 lb of effluent, with not more than 50% of this maximum to be retained on a 325 mesh screen.

D. For those processes and operations not specified in subsections A., B., or C. above, the maximum particulate emissions shall be prescribed by the Minister on a case-by-case basis.

E. The following activities and operations are exempt from the limitations of this section III.

1. Starting a new fire in an incinerator, or a processing or manufacturing plant.
2. Banking or cleaning fires in an incinerator, or a processing or manufacturing plant.
3. Soot blowing or process purging.
4. Fires used in firefighting training under the direction or consent of a municipal fire department, or the Provincial Fire Commissioner or his representative, or the Director under The Disaster Services Act or his representative, provided that the Director of Pollution Control is notified in advance of the training.
5. Fires used for warmth, comfort or recreational purposes inside dwellings and fires used for recreational purposes outside dwellings.
6. Fires used for community recreational events which have the prior approval of an officer of the municipality, appointed for that purpose.
7. Open fires for disposing of burnable debris or prohibited debris that are authorized under the Clean Air (General) Regulations.
8. Operations or activities specifically authorized in writing by the Director of Standards and Approvals for such period as he specifies.

ALBERTA SOLID WASTE REGULATIONS - NEW SOURCES

Agencies: Provincial Board of Health,
Local Boards of Health

I. GENERAL

A. Definitions

1. "Dry disposal site" means a type of waste disposal system in which non-offensive waste material may be deposited and ultimately covered by earth or other suitable cover material as hereinafter provided in these regulations.

2. "Modified landfill" means a type of waste disposal system in which waste material is deposited by plan on a specified location, and then on basis less frequent than that required for a sanitary landfill,

   a) is compacted by force applied by mechanical equipment, and

   b) then covered by a layer of earth or other suitable cover material.

3. "Sanitary landfill" means a type of waste disposal system in which waste material is deposited by plan on a specified location and then on a daily or three times a week basis dependent on the size of the community as specified elsewhere in these regulations,

   a) is compacted by force applied by mechanical equipment, and

   b) then covered by a layer of earth or other suitable cover material.

4. "Unclassified waste disposal system" means a waste disposal system other than a dry disposal site, incinerator, modified landfill, sanitary landfill or transfer station, but does not include any waste disposal system where final disposal of waste material is primarily by incineration or by depositing on the surface or close to the surface of land.

5. "Waste disposal system" means any land upon which, or any building in which, waste material is deposited or processed for incineration, ultimate disposal or decomposition, and shall include:

   a) any transfer station, and

   b) any facilities provided at the site for the

I. GENERAL (CONT)

storage of waste and cover material, and

c) any facilities for the handling and disposal of waste, and

d) any land or buildings or machinery or other facilities appertaining to the purpose of the waste disposal system.

6. "Waste material" means garbage and solid refuse and similar material.

B. General Provisions

1. Permissible Waste Disposal Systems

Except as provided in II.B.2, no person, municipality or corporation shall dispose of waste material in any place other than:

a) a dry disposal site, modified landfill, sanitary landfill or unclassified waste disposal system established, operated and maintained in accordance with these regulations, or

b) an incinerator constructed, operated and maintained in accordance with:

i) the Provincial Board of Health Regulations for the Control of Air Pollution, and

ii) the Clean Air Act and Regulations made pursuant thereto.

2. Notwithstanding B.1 above, a dry disposal site may not be used for disposal of waste material except as provided in II.D.2.

3. a) If required by the Provincial Board of Health any corporation shall provide, operate and supervise a waste disposal system for disposal of specified wastes or all wastes created in any plant or factory operated by such corporation or for the disposal of wastes created in any camp or community occupied by employees of such corporation.

I. GENERAL (CONT)

b) Any waste disposal system required by the Provincial Board of Health under authority of subsection (1) shall comply with the requirements of these regulations and the corporation concerned shall have the same responsibility as a municipal government for the proper operation of the waste disposal system.

4. a) Any corporation may provide, operate and supervise a waste disposal system for disposal of specified waste materials or all waste materials created in any plant or factory operated by such corporation or for the disposal of waste materials created in any camp or community occupied by employees of such corporation.

b) Any waste disposal system established by a corporation as authorized by subsection (1) shall comply with the requirements of these regulations and the corporation concerned shall have the same responsibility as a municipal government for the proper operation of the waste disposal system.

5. a) Any corporation which is required or authorized to provide a waste disposal system may enter into contract with a municipality, person or second corporation to provide and/or operate such waste disposal system.

b) In any case where a contract is entered into the municipality, person or second corporation shall have the same responsibility as the original corporation would have under these regulations for the proper provision and/or operation of the waste disposal system.

6. Except as otherwise provided herein, every municipality and every corporation which is required by these regulations to provide a waste disposal system must accept all waste material created within the municipality or created by the corporation at its waste disposal system.

7. Notwithstanding 6. above a municipality shall not be required to accept at its waste disposal system waste material from any factory or other business premises:

I. GENERAL (CONT)

a) which exceeds in volume before compaction one cubic yard per day, or

b) which exceeds in weight one ton per day, or

c) which by itself or in combination with other material likely to be present in the waste disposal system:

i) may create a danger to the health or safety of persons employed at or visiting the waste disposal system, or

ii) may be a public hazard.

8. Supervision of Waste Disposal Systems

a) The local Board of Health having jurisdiction in the municipality served by a waste disposal system shall have supervision of such waste disposal system and shall give such direction to the person, municipality or corporation in responsible charge of such waste disposal system as may be necessary so the the operation will be in accordance with the requirements of these regulations.

b) It shall be the responsibility of the person, municipality or corporation operating a waste disposal system to provide supervision, staff and equipment to ensure that the said waste disposal system does not become offensive or unsightly and is operated in accordance with the requirements of these regulations.

9. Collection and Transportation Vehicles

a) Every person, municipality or corporation which provides a service for the collection and/or transporation of waste material shall ensure:

i) that all vehicles used for such service are equipped with suitable cover to prevent waste material dropping off en route, and

ii) that covers are used and the vehicles operated in such a manner as to prevent waste materials dropping off en route.

I. GENERAL (CONT)

10. If salvage operations are carried out at any waste disposal system they shall be performed in such a manner as not to interfere with the proper operation of the waste disposal system as required by these regulations.

II. CRITERIA FOR SPECIFIC REFUSE DISPOSAL SITES AND SYSTEMS

A. Permits. Except as otherwise provided herein, no person, municipality or corporation shall establish, construct or operate a sanitary landfill, modified landfill, dry disposal site, or an unclassified waste disposal system unless a permit to do so has been obtained from the Provincial Board of Health.

B. Sanitary Landfills

1. Permit Applications

a) Every application to establish or construct a sanitary landfill shall be accompanied by maps, plans, design data and information as specified [in these regulations].

b) The maps, plans, design data and information required by a) shall be prepared by a professional engineer registered to practice in Alberta and shall bear his seal.

2. Locations

a) No sanitary landfill shall be established, constructed or operated so that there is any disposal of waste material within 300 feet of any cemetery which is being or has been used for human burials at the time the sanitary landfill is established or constructed.

b) Except as provided in subsections c), d), and e) hereinafter no sanitary landfill shall be established, constructed or operated within 1,500 feet of any hospital, restaurant or other place where food for humans is prepared or stored, or of any dwelling being used for human habitation at the time the sanitary landfill is established or constructed.

c) Subsection b) shall not apply in the case of a dwelling which is owned by the person, municipality or corporation which owns or operates the sanitary landfill and which is occupied by the owner or an employee of the said owner.

d) The Provincial Board of Health may relax the requirements of b):

  i) where a sanitary landfill will be operated for a defined number of years and will result in an improvement to the area used for sanitary landfill purposes; or

  ii) where in the opinion of the said Board, satisfactory buffer arrangements will be provided.

e) Where the conditions of d) will not apply the Provincial Board of Health may still relax the requirements of subsection b) where in the opinion of the said Board satisfactory safeguards are or will be provided for the protection of the rights of persons who would otherwise be protected by b).

3. Every sanitary landfill shall be designed and operated in accordance with the latest edition of the Provincial Board of Health Design and Operating Standards for Sanitary Landfills.

4. a) Where a sanitary landfill serves a population of less than 20,000 cover shall be applied at least three times per week.

   b) Where a sanitary landfill serves a population greater than 20,000 cover shall be applied on a daily basis.

   c) The requirements of subsections a) and b) may be relaxed during winter operations in accordance with the provisions of the Provincial Board of Health Design and Operating Standards for Sanitary Landfills.

5. Characteristics of Cover Material. The soil used as daily cover material shall be of such character that it can be compacted to provide a tight seal that does not crack excessively when dry and is free of putrescible materials and large objects. Soil for the final cover shall be adequate to accommodate the proposed use of the area on completion of the landfill.

II. CRITERIA FOR SPECIFIC REFUSE DISPOSAL SITES AND SYSTEMS (CONT)

6. Water Pollution. Sanitary landfill operations shall not be conducted in locations where pollution of surface or underground water may result. Provision shall be made to divert run-off water away from the fill area and to keep the working area dry.

7. Equipment. Adequate equipment shall be available to operate the landfill in accordance with good engineering practice and the requirements of these standards.

8. Plans and Specifications. All sanitary landfills shall be designed in accordance with the Provincial Board of Health Regulations for the Control of Refuse Disposal Systems and these Standards by a professional engineer registered to practise in Alberta and shall bear his seal. Detailed plans, specifications and necessary reports shall be submitted by the engineer or the municipality, person or corporation to the Provincial Board of Health for approval. Any proposed alterations or deviations from these plans must also be submitted for approval.

9. On-site Roads. On-site roads shall be designed and constructed so that daily operating traffic will flow smoothly and will not be interrupted by ordinary inclement weather. They must be suitable for carrying traffic in all seasons and dust shall be adequately controlled.

10. Control of Blowing Wastes. Suitable windbreaks shall be provided to prevent wastes from blowing from the working area onto the adjoining properties.

11. Design Criteria and Other Requirements for Operation

    a) Unloading of Refuse. Unloading of refuse at the sanitary landfill working face shall be continuously supervised by the machine operator or attendant, except as otherwise provided herein.

    b) Blowing Refuse. The entire area shall be inspected and tidied regularly. Adequate windbreaks shall be maintained to control blowing refuse.

II. CRITERIA FOR SPECIFIC REFUSE DISPOSAL SITES AND SYSTEMS (CONT)

be covered by a permit in accordance with these regulations shall be operated in such a manner as to comply with all other requirements of these regulations.

3. Locations. The provisions of B.2. above shall also apply to modified landfills. Additionally, except as otherwise provided herein, a modified landfill shall not be established, constructed or operated within 300 feet of any developed road allowance, highway, street or other traveled road.

   Nothing herein shall prevent the construction of an access road for the conveyance of waste or refuse to the modified landfill.

4. a) Any person, municipality or corporation operating a modified landfill shall erect a fence to enclose the said modified landfill and approach thereto and shall maintain such fence in good repair.

   b) The fence required by subsection a) shall be of a type and quality which will prevent livestock gaining entry to the modified landfill and will reduce the blowing of paper from the modified landfill to surrounding lands.

5. It shall be the responsibility of the persons, municipality or corporation operating a modified landfill to ensure that every matter or thing deposited in such modified landfill shall be covered with a layer of earth or other material to deodorize the material deposited and to prevent the breeding of flies and the harboring of rats and to prevent any other nuisance.

6. There shall be no burning of waste material in any modified landfill.

7. Except as otherwise provided herein every modified landfill shall be provided with suitable trenches or pits to receive all waste material.

8. a) In lieu of trenches or pits the Provincial Board of Health may approve other arrangements for the operation of a modified landfill which will fulfill the intent to facilitate compaction and covering of waste material.

II. CRITERIA FOR SPECIFIC REFUSE DISPOSAL SITES AND SYSTEMS (CONT)

b) In no case shall a modified landfill be operated in a manner which will be based on the unconfined depositing of waste material on the ground surface.

9. a) The waste material in the trench or pit shall be covered with soil or other suitable material at such intervals and in such quantities as shall be necessary to fulfill the requirements of subsection 5. but except during winter the interval shall not exceed three months.

b) The waste material should be compacted before the cover required by subsection a) is applied.

c) Any waste material which was not deposited in the trench or pit shall be pushed into the trench or pit at such times as the cover required by subsection a) is to be applied.

d) When a trench or pit is filled, a final cover of at least two feet of suitable soil shall be applied and the area seeded to grass.

e) An adequate number of trenches or pits shall be prepared before winter to receive all waste material which may be created during the winter.

D. Dry Disposal Sites

1. No dry disposal site shall be established, constructed or operated within 300 feet of any cemetery which is being or has been used for human burials at the time the dry disposal site is established or constructed.

2. a) Materials accepted for disposal at a dry disposal site shall be limited to those which are non-toxic and non-putrescible in nature.

b) Without limiting the provisions of subsection a), a dry disposal site generally may be used for the disposal of ashes, demolition refuse, non-combustible residue from incinerators and similar waste material.

c) Without limiting the provisions of subsection a), a dry disposal site shall not be used for the disposal of kitchen garbage, manure, oil,

II. CRITERIA FOR SPECIFIC REFUSE DISPOSAL SITES AND SYSTEMS (CONT)

chemical waste or other offensive material.

3. The person, municipality or corporation operating the dry disposal site shall make positive provision to limit the use of the dry disposal site in accordance with subsection 2.

4. There shall be no burning of material in any dry disposal site.

5. When a dry disposal site is to be closed the person, municipality or corporation responsible shall ensure that all waste material in the site is fully covered with an adequate layer of suitable soil and that the area is completed to conform with surrounding properties.

6. a) If a dry disposal site is not used for a period exceeding 12 consecutive months it shall be considered closed and the action required by subsection 5. shall be carried out.

   b) The closing of a dry disposal site under subsection a) shall not act as a bar to the reopening of the site at a later date:

      i) subject to the provisions for new disposal site permits;

      ii) provided such reopening is in accordance with the provisions of these regulations.

E. Unclassified Waste Disposal Systems

1. Locations. The provisions of B.2 above shall also apply to unclassified waste disposal systems.

III. DISPOSAL OF INFLAMMABLE LIQUIDS OR INDUSTRIAL WASTES

A. Notwithstanding the provisions of other sections of these regulations, whenever the disposal of any inflammable liquid or industrial waste creates a problem distinct from the disposal of domestic waste, the method of disposal of such industrial waste shall be subject to the approval of the Provincial Board of Health.

BRITISH COLUMBIA WATER REGULATIONS - NEW SOURCES

Agency: Department of Land, Forests, and Water Resources; Pollution Control Branch (Ministry of the Environment)

I. GENERAL

A. Definitions

1. "Fresh water" includes lakes, rivers, and streams.

2. "Marine water" means estuarine and coastal water where estuarine means a semi-enclosed coastal body of water having free connection to the sea, and containing a measurable quantity of sea salt (for example, in excess of 1,000 mg/l chloride ion).

3. "Hazardous waste" means waste which, because of its inherent nature and quantity, requires special disposal techniques to avoid creating health hazards, nuisances, or environmental pollution. Hazardous wastes are toxins, corrosives, irritants, strong sensitizers, flammables, explosives, or infectious or condemned foods.

4. "Initial dilution zone" means for marine waters and lakes, waters contained within an area extending 300 feet in all directions from point of discharge; for rivers or streams, waters contained within an area extending 300 feet down current from a point of discharge, and within a lateral distance not exceeding one-half the width of a river or stream at the point of discharge.

B. General Provisions

1. For any process, or combination of industrial processes, not specifically described herein, reference must first be made to these criteria to determine relative applicability. Extrapolation of closely applicable objectives may be permitted or, where not deemed permissible, the Director shall establish minimum requirements.

2. Waste treatment and disposal should strive to eliminate toxicity and reduce total quantity in order to provide maximum protection to the environment. Dilution of effluent discharges is not an acceptable substitute for treatment.

I. GENERAL (CONTD.)

3. These objectives are minimum requirements, and for situations in which the dilution afforded by a receiving body of water is less than 20 to 1, requirements may be more stringent.

4. Natural drainage and storm run-off waters should be diverted around those portions of the plant where contaminants could be introduced. Separate sewer systems should be used for uncontaminated waters, domestic wastewater, and process effluent.

5. Recommended guidelines for in-plant and out-plant controls.

   Initial emphasis should be placed on the control of losses and the volumetric reduction of waste streams within the plant. The achievement of these ends embodies the application of controls such as in-plant liquid recycle, process instrumentation, supervision, care in handling spills, and housekeeping.

   In conjunction with in-plant controls, maximum efforts should be made to provide external methods of dealing with the waste stream. Properly engineered and constructed tailings lines and impoundments, the recycling of supernatant, additional treatment such as pH adjustment, the provision of alternate facilities for use in emergencies, the control and diversion of surface waters to prevent contamination, and the control of seepage are some of the out-plant pollution control criteria which shall be evaluated. All new plants must embody reliable pollution controls in their process design.

C. Initial Dilution (Mixing) Zone.

It is recognized that the receiving-water quality guidelines listed herein may not be satisfied at the immediate vicinity of the point of effluent discharge. There must be an initial dilution zone which is defined in subsection I.A. in terms of a distance from the point of discharge for marine waters and lakes, and in the case of streams or rivers in terms of both a distance downstream from a discharge and a fraction of the width of the stream or river at the discharge. The latter provision relates to passage of aquatic life past the point of discharge.

BRITISH COLUMBIA WATER REGULATIONS - NEW SOURCES

I. GENERAL (CONTD.)

The defined distance is recognized as an objective which may not be achievable at specific sites with reasonable precautions. This distance may be modified on the basis of appropriate environmental data demonstrating effects and distance involved. In certain cases, specific effluent parameters may be allowed an extended dilution zone.

D. Outfalls.

1. Outfalls should be combined into the minimum number possible. A single outfall for process water is recommended. Whenever possible, process water and other waste streams should be combined after treatment before discharge.
2. All outfalls should be submerged at a depth below the lowest receiving-water level. In certain situations, a study of water-circulation patterns and biological characteristics may be required to assess optimum placement of the outfall, and the design of the outfall should give consideration to proper diffusion.

E. Cooling-water Discharges.

Discharges of water used for indirect cooling (heat exchangers, bearing, etc.) on a once-through basis shall not contain more than 2.0 mg/l of oil above background.

II. EFFLUENT DISCHARGE CRITERIA AND LIMITATIONS

A. Effluent criteria, objectives, and standards are shown on Table 1 in subsection II.G. for the following industry groups:

Industry Category I	Petroleum Refineries
Industry Category II	Miscellaneous Chemical Industries Other Than Petroleum Refineries
Industry Category III	Mining, Mine-Milling and Smelting Industries including Coal-preparation Plants and Coke Plants
Industry Category IV	Metal-finishing Plants and Industries Discharging Heavy Metals

II. EFFLUENT DISCHARGE CRITERIA AND LIMITATIONS (CONTD.)

The criteria are for the effluent discharge to fresh and marine waters, which are defined in I.A.

B. General Effluent Criteria

1. Waste treatment and disposal techniques should minimize effluent toxicity and volume, and provide for protection of the receiving environment.

2. No criteria are given on the table for the discharge of effluent to the ground, which method is to be judged on a case-by-case basis. See subsection B.7 for guidelines on subsurface disposal to ground.

3. The criteria shown in this subsection assume a dilution of 20:1 is available in immediate receiving waters. Situations affording lesser dilution shall be evaluated on a site-specific basis.

4. Nondefinitive criteria.

   Definitive objectives cannot be established for certain discharges at this time. Industries not covered by definitive objectives include wineries, sugar refineries, asphalt batch plants (wastewater only), wood-preservation plants, and some miscellaneous industries. These industries will be reviewed periodically as information becomes available with the intent of formulating definitive objectives. In the meantime, minimum requirements for discharges from these operations will be judged on a case-by-case basis.

5. Extrapolation of criteria to other industrial processes and/or combinations.
   Reference must be made to the criteria listed herein to determine the relative applicability of such to parameters resulting from processes or combination(s) of industrial processes, different from those included herein. Thereafter, extrapolation from closely applicable objectives may be permitted. Where sufficient latitude for extrapolation is not deemed to be available, it is recommended that the Director establish the required objectives.

6. Drainage and Seepage Flows.

   In cases where contaminated drainage or seepage flows could develop, it is recommended that the leaching potential be evaluated so that precautionary measures can be undertaken as required. Measures to prevent acid production should be initiated when it is known the potential exists, rather than rely on treatment and disposal techniques after such production has developed.

7. Subsurface effluent disposal to land.

In many cases effluents from food-processing, agriculturally orientated, and miscellaneous industries are suitable for subsurface disposal. Disposal schemes include tile fields, seepage beds, or percolation pits, and exfiltration basins. Specific objectives have not been developed, but the following guidelines are recommended:

a) Groundwater table and impermeable layers. The groundwater table should generally be at least 4 feet below the bottom of a trench in a tile field, or the bottom of a pit in a seepage bed or percolation pit. Impermeable soil layers should also be located at this minimum distance. Variations in the distance to groundwater table can be used in specific cases if it can be shown that contamination of groundwater will not occur. In the case of exfiltration basins, the distance between ground surface and groundwater table must be determined on an individual basis.

b) Site boundaries. The boundaries of subsurface disposal sites should be at least 100 feet from domestic wells or surface water.

c) Design of disposal systems. The length of tile field, or the area of percolation pit or exfiltration basin required, will depend upon several factors, including percolation tests results, volume of effluent discharged, and effluent characteristics. Consideration should be given to the installation of dual disposal systems to permit one system to rest and thus allow continuous operation.

d) Monitoring. All subsurface discharges to land should be monitored periodically. Groundwater should be sampled to detect possible contamination. A record of effluent flow rate should be kept and adjacent wells or surface water sampled as necessary to establish that such waters are not being impaired or contaminated.

BRITISH COLUMBIA WATER REGULATIONS - NEW SOURCES

II. EFFLUENT DISCHARGE CRITERIA AND LIMITATIONS (CONTD)

C. Petroleum Refinery Effluents (Industry Category I)

1. The criteria listed on Table 1 for this category include the storm run-off from the processing area but exclude once-through cooling water used for indirect cooling, storm run-off from dyked tank storage areas, storm run-off from undeveloped areas, and ballast waters.

   The oil content of storm run-off from dyked tank storage areas or ballast waters from ships must not exceed 5 mg/l.

2. Discharges of water used for indirect cooling on a once-through basis shall not contain more than 2.0 mg/l of oil above background.

3. Toxicity requirements for refinery effluents are based on bioassays to be conducted on fish of the salmonid species since, in addition to being a sensitive species, the commercial and sports fishing value is of major importance in British Columbia. Precise knowledge of the constituents of refinery effluents which result in toxicity is not known at the present time.

D. Miscellaneous Chemical Industries Other Than Petroleum Refineries (Industries Category II)

1. Generally, effluent quality can be improved by good in-plant control, maintenance, and housekeeping. In exceptional cases, where the effluent quality cannot be met by practicable treatment, an effluent diffuser may be used which is designed to give sufficient immediate dilution. Such variances will be determined on an individual basis.

E. Mining, Mine-Milling, and Smelting Industries Including Coal-Preparation Plants and Coke Plants (Industry Category III)

1. Waste waters from coal-preparation plants may be controlled in a closed effluent circuit.

2. Waste waters from coke plants may be controlled in a closed effluent circuit.

II. EFFLUENT DISCHARGE CRITERIA AND LIMITATIONS (CONTD)

3. Other effluents.
Objectives have not been specified for the disposal of domestic sewage from the industry. However, the following criteria may be used as guidelines for a mine-mill complex:

a) Domestic sewage should be collected and treated separately.

b) The introduction of domestic waste which has received a minimum of septic tank treatment may be permitted into a tailing impoundment where

i) the volume of domestic waste is less than 1 percent of the plant discharge to the pond;

ii) adequate monitoring of pond discharge demonstrates that a level of quality acceptable to the control agency has been achieved in the reclaim of decant water.

F. Metal-Finishing Plants and Industries Discharging Heavy Metals (Industry Category IV)

1. Due to the toxic nature of contaminants discharged from these operations, objectives are expressed in terms of concentration only. Recovery and reuse of heavy metals from effluents should be carried out wherever practical and water usage minimized to reduce the total amount of contaminants being discharged. The discharge from drum-cleaning plants of toxic materials such as herbicides, pesticides, and chlorinated hydrocarbons will generally not be permitted. Dilution of the discharge is not allowed as a form of treatment to meet these objectives.

G. Specific Effluent Criteria (See Table 1 on the following pages)

TABLE 1

EFFLUENT CRITERIA FOR SPECIFIC INDUSTRY GROUPS

	Industrial Category						
	Ig		II		III		IV
Numbers in () represent lb/1000 lb crude oil processed.	Marine W.	Fresh W.	Marine W.	Fresh W.	Marine W.	Fresh W.	Marine or Fresh W.
BOD, 5 day, 20°C, mg/l	(2.3)a	(2.3)a	20	20	--	--	--
Dissolved O , mg/l	>1.0	5.0	--	--	--	--	--
pH	6.5-8.5	6.5-8.5	6.5-8.5	6.5-8.5	6.5-8.5	6.5-8.5	6.5-8.5
Temp., °F, max.	90	90	90	90	--	--	--
Turbidity, J.T.U.	15	10	15	10	--	--	--
Color	--	--	20	15	--	--	--
Toxicity	75e	100e	50e	100e	100	100	--
Process Effl. Vol, IGPM/1000 BPD	8.0f	8.0f	--	--	--	--	--
Suspended Solids, mg/l	20b	20b	20b	20b	50	50	--
Settleable Solids, mg/l	<0.5	<0.5	<0.5b	<0.5b	--	--	--
Floatable Solids, mg/l	--c	--c	--c	--c	--	--	--
Total Solids, mg/l	3000d	1500	3000	1500d	--	--	--
Phenols, mg/l	(0.023)	(0.023)	0.2	0.2	--	--	0.2
Oil, nonvolatile, mg/l	--	--	--h	--h	--	--	--
Oil, total, mg/l	(1.15)a	(0.58)a	10	5	15	15	--
Dissolved Solids, Total mg/l	--	--	--	--	--	<2,500	--
Non-Metallic Compounds							
Ammonia (as N), mg/l	(0.576)	(0.576)	10	10	0.5a	0.5a	1.0
Chlorate, mg/l	--	--	75	50	--	--	--
Chloride ion, mg/l	--	--	--i	--i	--	--	--
Chlorine, residual, mg/l	--	--	0.2	0.2	--	--	--
Cyanide, mg/l	0.1	0.1	--	--	0.1	0.1	0.5
Fluoride (as F), mg/l	--	--	2.5	2.5	2.5	2.5	5.0
Formaldehyde, mg/l	--	--	5	5	--	--	--
Nitrates and Nitrites (as N), mg/l	--	--	10	10	10	10	10
Nitrogen, total, mg/l	--	--	15	15	--	--	--
Phosphate (as P), mg/l	3.0	1.0	--	1.0	2.0	2.0	2.0
Sulphate (as SO), mg/l	--	--	--i	--i	--	50	100.0j
Sulphides & Mercaptans (as S), mg/l	(0.011)	(0.011)	0.1	0.1	--	--	--
Uranyl, mg/l	--	--	--	--	2.0	2.0	--
Urea, mg/l	--	--	2.0	1.0	--	--	--

TABLE 1 (CONTD.)

EFFLUENT CRITERIA FOR SPECIFIC INDUSTRY GROUPS

Numbers in () represent lb/1000 lb crude oil processed.	Industrial Category I		II		III		IV
	Marine W.	Fresh W.	Marine W.	Fresh W.	Marine W.	Fresh W.	Marine or Fresh W.
Metals							
Aluminum, mg/l	--	--	--	--	0.5	0.5	0.02
Antimony, mg/l	--	--	--	--	0.05	0.05	5.0
Arsenic, trivalent, mg/l	--	--	0.05	0.05	0.05	0.05	1.0
Barium, mg/l	--	--	1.0	1.0	--	--	--
Boron, mg/l	--	--	15	10	--	--	--
Cadmium, mg/l	--	--	--	--	0.005	0.005	0.02
Chromium, mg/l	0.2	0.2	0.2	0.2	0.05	0.05	0.15k
Cobalt, mg/l	--	--	--	--	0.1	0.1	1.0
Copper, mg/l (Total)	0.1	0.1	0.1	0.1	0.05	0.05	0.1
Iron, mg/l	--	--	--	--	0.3	0.3	0.5
Lead, mg/l	0.2	0.2	0.2	0.2	0.05	0.05	0.2
Manganese, mg/l	--	--	--	--	0.05	0.05	1.0
Magnesium, mg/l	--	--	--	--	--	150	--
Mercury, mg/l	--	--	0.002	0.002	0.001a	0.001a	0.005
Molybdenum, mg/l	--	--	--	--	0.50a	0.50a	10
Nickel, mg/l (Total)	0.2	0.2	0.2	0.2	0.3	0.3	1.0
Selenium, mg/l	--	--	--	--	0.05	0.05	0.2
Silver, mg/l	--	--	--	--	0.10	0.10	0.05
Tin, mg/l	--	--	--	--	--	--	2.0
Zinc, mg/l	0.2	0.2	0.2	0.2	0.5	0.5	0.3

TABLE 1 (CONTD.)

EFFLUENT CRITERIA FOR SPECIFIC INDUSTRY GROUPS

Footnotes to Table 1:

a) Tentative, subject to review.
b) Not applicable to discharges to exfiltration ponds.
c) Negligible.
d) Depends upon the nature of solids other than normal marine composition.
e) 96-hour TLM static bioassay on salmonid species, expressed as percent by volume of effluent in receiving water which is required to give 50 percent survival over 96 hours.
f) Normal dry weather flow (does not include storm run-off). Not a restrictive objective. If effluent volume discharged is greater, concentrations must be reduced proportionately.
g) These criteria include process effluent and storm run-off from the processing area. Excluded are ballast waters from ships, once-through cooling water used for indirect cooling, and storm run-off from dyked tank storage areas and undeveloped areas.
h) For discharge of once-through cooling water used for indirect cooling (heat exchangers, etc.), the maximum permissible oil concentration is 2 mg/l above background.
i) While the importance of these characteristics is recognized, no limits have bee established at this time.
j) Objectives for sulphate are not applicable to discharges to marine waters.
k) Hexavalent and trivalent chromium.

III. RECEIVING WATER QUALITY CRITERIA AND STANDARDS

A. Receiving Water Guidelines

Detailed criteria or standards cannot be prepared at this time due to the complexity of interactions among the parameters which define a receiving body of water. Parameters may also be dependent on site locations. Therefore, guidelines only are presented in Table 2 (subsection III.B. below) for a limited number of parameters or characteristics of receiving waters. Generally, minimal change from background or natural values is desirable and waterborne wastes should be nontoxic in receiving waters to resident or transient biota.

The parameters and monitoring frequencies listed in TABLE 2 relate principally to chemical and physical criteria. It is recommended that a continuing and long-term assessment be undertaken in order to determine the nature and extent of changes in natural biological populations. Such may include flora and vertebrate and invertebrate fauna for the following general categories of organisms: benthos, intertidal, periphyton, plankton, nekton, and neuston. Resident and transient types would be included. No specific objectives are recommended at this time for biological parameters. However, if no change is indicated in a given parameter, it may not be assumed that other parameters are unaffected.

In the development of schedules for monitoring of receiving-water quality, it is recommended that sampling periods correspond to peak periods of effluent discharge, and as well to major trends in the natural patterns of flow, physical-chemical characteristics, and biological cycles. Preferably, three to four examinations should be made annually, although one to two examinations during the height of biological activity may be adequate in some instances.

TABLE 2

RECEIVING WATER QUALITY CRITERIA

(See II.A for Definitions of Industry Categories)

	Industrial Category				
	I and II		III		IV
	Marine W.	Fresh W.	Marine W.	Fresh W.	Fresh or Marine W.
Dissolved O (% of seasonal natural value)	90	90	90	90a	≥90a
pH	No change	No change	±0.2b	±0.2b	No change
Turbidity, APHA Units, max.	+5	+5	+5b	+5b	+5b
Settleable Solids, mg/l	Negligible	Negligible	--	--	Negligible
Floatable Solids, mg/l	Negligible	Negligible	None	None	Negligible
Dissolved Solids, mg/l	--	+100	--	--	--
Heavy Metals	No measurable change	No measurable change	--	--	--
Phenols, mg/l	<0.001	<0.001	--	--	--
Temp. change, °F or °C max.	+2°F	+2°F	+3°C	+3°Cb	±1°C
Coliforms, MPN/100 mg/l	--	--	--c	--c	--d
Chlorine residual, mg/l	Below detectable limit	Below detectable limit	--	--	Below detectable limit
Chloride, mg/l	--	--	--	+25b	--
Alkalinity (as CaCO), mg/l	--	--	--	-20%b	--
Color, APHA Units	--	--	--c	--c	No appreciable change
Aesthetics	--	--	No decrease	No decrease	No decrease
Toxicity	Below detectable limit	Below detectable limit	Below detectable limit	Below detectable limit	Below detectable limit

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a) Not applicable to lakes or natural impoundments; these will be assessed on an individual basis.

b) Variations in water quality, due to the discharge of waste, should not exceed the numerical increments listed.

c) To be reviewed.

d) Most Probable Number Index per 100 ml, not to exceed established B.C. Health Branch Recommended Water Quality Standards.

BRITISH COLUMBIA AIR REGULATIONS - NEW SOURCES

Agency: Department of Lands, Forests,
and Water Resources; Pollution Control
Branch (Ministry of the Environment)

I. GENERAL

A. Definitions

1. "Act" means the Pollution Control Act, 1967.

2. "Director" means the Director of Pollution Control and includes any Assistant Director and any person appointed by the Board as Acting Director.

3. "Board" means the Pollution Control Board.

4. "Minister" means the Minister of Lands, Forests, and Water Resources.

5. "Air" means the atmosphere, but does not include the atmosphere within a building or within the underground workings of a mine.

6. "Contaminant" means any substance, whether gaseous, liquid, solid, odorous, or any combination of any of them,
   a) that is foreign to or in excess of the natural constituents of the air; or
   b) That affects the natural, physical, chemical, or biological quality of the air,

   and that is, or may be, injurious to health and safety or comfort of a person or injurious or damaging to property or to plant and animal life, or that may interfere with visibility or the normal conduct of transport or business or is obnoxious to the public.

7. "Industrial refuse" means discarded solid or nonaqueous liquid materials resulting from an industrial process, not including airborne solids in gaseous emissions, nor suspended solid material of low concentration carried in liquid effluents.

8. "Hazardous Waste" means waste which, because of its inherent nature and quanity, requires special disposal techniques to avoid creating health

I. GENERAL (Contd)

hazards, nuisances, or environmental pollution. Hazardous wastes are toxins, corrosives, irritants, strong sensitizers, flammables, explosives, or infectious or condemned foods.

9. "Pollution" means the introduction into a body of water, or storing upon, in, or under land or discharging or emitting into the air such substances or contaminants of such character as to substantially alter or impair the usefulness of the land, water, or air.

10. "Particulate matter" means any material, other than uncombined water, which exists in a finely divided form as a liquid or solid measured according to the latest edition of the Pollution Control Branch's "Source Testing Manual for the Determination of Discharges to the Atmosphere."

B. General Provisions

1. If the desirable level of ambient air quality is not maintained in a specific area the allowable objectives for gaseous and particulate emissions herein or as authorized by a specific permit may require revision in order that the desired ambient air quality can be maintained.

2. Odours
The discharge of odour-producing compounds must be controlled, using best practicable technology to minimize objectionable odour at the plant boundary or at the point of impingement if outside the plant boundary.

3. Dilution prohibited
Dilution is not an acceptable method of meeting emission objectives.

4. For any process or combination of industrial processes not specifically described herein, reference must first be made to these objectives to determine relative applicability. Extrapolation of closely applicable objectives may be permitted. Where such extrapolation is not deemed suitable, the Director may establish minimum requirements.

I. GENERAL (Contd)

5. Plant Pollution Controls.
Reliable in-plant and out-plant controls are of primary importance in reducing the volume of wastes discharged and in improving their quality. Such controls as recycling can frequently be employed to significantly reduce the volume of waste discharged.

6. Emergency and Abnormal Operating Conditions.
It is not intended that these objectives cover emergency or abnormal operating conditions which may result in noncompliance. Where required, permits will include a "maintenance and emergency procedures" clause requiring abnormal conditions to be reported to the Director, along with any information considered necessary.

7. Waste-management Planning.
Waste-management planning is a fundamental necessity for any industry in order to achieve an effective approach to pollution abatement. Such an approach involves simultaneous considerations of air pollution and water pollution abatement as well as solid-waste management. Since a definitive interaction exists between each phase of waste management, any one phase should not be ignored at the expense of another when attemping to reduce pollution to a minimum. Interest should be focused on a net over-all reduction of final waste losses.

The above approach could result in an increased quantity of waste being discharged to one segment of the receiving environment. However, when technology exists whereby a waste may be disposed of into an alternative medium, the over-all objective should be to reduce the volume of waste discharged and to dispose of it in that medium which exhibits the greatest assimilative capacity, and in this way provide the greatest contribution toward protection of the environment.

BRITISH COLUMBIA AIR REGULATIONS - NEW SOURCES (CONTD)

II. Emission Standards for Petroleum Refineries

A. Specific Standards:

Sulphur Plant

Sulphur recovery, % (a) - 99+
SO_2, mg/M^3(ppm) - 830(300)

Over-all Refinery

SO_3, mg/M^3 (gr/SCF) - 25(0.011)

FCCU Regenerator

Particulate Solids, mg/M^3 (gr/SCF) - 115 (0.050)
CO, mg/M^3(ppm) - 2400(2000)
SO_2, mg/M^3(ppm) - 830(300)
Hydrocarbons (as Hexane)
mg/^{3}(ppm) - 90(25)
lb/1000 bbls cracking feed - 20

Steam Plant

Particulate Solids, mg/M^3 (gr/SCF),
Corrected to 12% CO_2 - 150(0.065)
SO_2, mg/M^3(ppm) - 830(300)

(a) Total sulphur recovered from refinery fuel gases.

B. Additional Requirements, Objectives, and Guidelines (in conjunction with specific standards in II.A.)

1. At the present time the pollution control standards will apply to crude oil refining processes which may also include an oil refinery in conjunction with a natural gas and (or) petrochemical plant, where the pollutants are emitted through various stacks to the atmosphere.

2. FCCU Regenerator. Petroleum coke deposits on the surface of the catalyst used in catalytic cracking are removed by controlled combustion with air in the regenerator. Carbon monoxide, particulates, sulphur oxides, ammonia, nitrogen oxides, and hydrocarbons may be emitted from the regenerator stack.

   Carbon monoxide emissions can be reduced by the installation of a CO boiler which will provide a part of the steam requirement of the refinery. Hydrocarbon emissions may also be reduced by controlled combustion. Particulate removal can be effected by the installation of two-stage or three-stage cyclones, or an electrostatic precipitator. Sulphur dioxide emissions from the catalyst

II. EMISSION STANDARDS FOR PETROLEUM REFINERIES

regenerator represent typically 7 to 10 per cent of the sulphur entering with the crude.

3. Gaseous Streams.
Gaseous streams from the distillation, catalytic cracking, catalytic reforming, desulphurization units, or gaseous by-products from any other processing unit, must be treated for removal of sulphur compounds prior to using as a fuel. Hydrogen sulphide should be processed and recovered as sulphur, with the sulphur plant recovery being as efficient as existing technology permits. Sulphur recovery will not be required at this time for refineries which discharge less than 5 long tons sulphur per day to the atmosphere, provided that ambient air-quality guidelines are not exceeded.

4. Heater and Power-Boiler Stacks.
Desulphurized natural gas or a low sulphur fuel oil must be used for fuels for process heaters and power boilers.

5. Flare Stacks.
All flare stacks must be smokeless. Where steam is employed, automatic steam control will be required.

6. Air-blowing of Asphalts.
Hydrocarbon emissions produced by the air-blowing of asphalts, although a small volume, have an objectionable odor and may form stable aerosols. Thus, entrained liquids should be separated and the gases deodorized before release to the atmosphere.

7. Storage Tanks.
Hydrocarbon vapours and other gases may be emitted from storage tanks. The emission of these vapours can be reduced by bottom loading, submerged loading, floating roof tanks, conservation vents, or by a vapour-recovery system.

   The following requirements will apply to any storage vessel having a capacity in excess of 54,000 imperial gallons and used for gasoline, crude oil, or petroleum distillates storage:

   (a) For petroleum products having a true vapour pressure not higher than 78 mm mercury (1.52

II. EMISSION STANDARDS FOR PETROLEUM REFINERIES (CONTD)

psia), the vessel must be equipped with a conservation vent or equivalent.

b) For petroleum products having a true vapour pressure higher than 78 mm mercury (1.52 psia), but not higher than 570 mm mercury (11.1 psia), the vessel must be equipped with a floating roof or equivalent.

c) For petroleum products having a true vapour pressure higher than 570 mm mercury (11.1 psia), the vessel must be equipped with a vapour recovery system or equivalent.

8. Miscellaneous Emissions

a) Hydrocarbon emissions from cooling towers should be reduced to a minimum.

b) Nuisance odours arising from waste-gas emissions should be eliminated.

c) Provisions will be required to prevent excessive sulphur dioxide emissions during on-stream regeneration of sulphur plant catalyst beds.

d) Control of hydrocarbon emissions from loading facilities may be required in the future.

III. Emission Standards for Stationary Industrial Combustion Sources (Fuel Burning Equipment)

A. Specific Standards - Maximum Emissions

1. Coal Combustion:
Total Particulates - 5.0 lb/T of coal
SO_2 - 20.0 lb/T of coal

2. Fuel-oil Combustion:
Total Particulates - 44 lb/1000 Imp. gal.
SO_2 - 100 lb/1000 Imp. gal.
NO_x(as NO_2) - 50 lb/1000 Imp. gal.

3. Natural gas combustion:
NO_x(as NO_2) - 200 lb/10^6 SCF

4. Liquefied petroleum gas combustion:
NO_x(as NO_2) - 50 lb/1000 Imp. gal

III. EMISSION STANDARDS FOR STATIONARY INDUSTRIAL COMBUSTION SOURCES (FUEL BURNING EQUIPMENT) (CONTD)

B. Additional Requirements, Objectives, and Guidelines (in conjunction with specific standards in III.A.)

1. Coal combustion.
   Particulates emitted from coal combustion consist primarily of carbon, silica, alumina, and iron oxide in the fly-ash. High-collection efficiency for particulate removal can be attained by cyclones in series with electrostatic precipitators.

   Sulphur oxides and nitrogen oxides are the major gaseous emissions. Use of low-sulphur coal is recommended where possible. Where this is not possible, the removal of sulphur dioxide from the flue gas must be considered. Emission of oxides of nitrogen may be primarily controlled by improved combustion techniques.

2. Fuel-oil combustion.
   Major emissions from fuel-oil combustion are sulphur dioxide and nitrogen oxides. Wherever possible, desulphurized fuel is recommended for control of sulphur dioxide emission. Control of nitrogen oxide emission may be attained by improving combustion techniques.

3. Natural gas combustion.
   Nitrogen oxide is the major emission from natural gas combustion and is a function of the temperature in the combustion chamber and the rate of cooling of the combustion products. Improved combustion techniques should be considered for reducing formation of nitrogen oxides.

4. Liquefied petroleum gas combustion.
   Liquefied petroleum gas, commonly referred to as L.P.G., consists mainly of butane, propane, or a mixture of the two.

   Nitrogen oxides constitute the major emission from the combustion of L.P.G and may be controlled by improved combustion techniques.

IV. EMISSION STANDARDS FOR THE PETROCHEMICAL INDUSTRY*

A. Specific Standards

Maximum Emission Concentrations:
(Concentrations in mg/M^3 (dry basis) and ppm by volume in parentheses, unless otherwise noted)

Acetaldehyde	3.8(2.1)
Acrolein	2.5(1.0)
Alkanolamines	60
Ammonia	180(250)
Benzene	800(250)
Carbon monoxide	2,400(2,000)
Cobalt	7.0(0.003)(a)
Copper	6.0(0.003)(a)
Cresol	220(50)
Dimethyl ether	190(100)
Diphenyl	10(2)
Formaldehyde	30(20)
Formic acid	90(50)
Hydrogen sulphide	7(4.7)
Maleic anhydride	10(2.5)
Mercaptans	(b)
Methanol	2,600(2,000)
Methyl ethyl ketone (2-butanone)	900(300)
MIBK (hexone)	2,050(500)
Organic disulphides	4
Organic sulphides	4
Particulate solids-	
Total	230(0.100)(a)
Organic chemical dust	115(0.050)(a)
Phenol	100(26)
Phthalic anhydride	120(20)
Styrene	200(47)
Toluene	3,750(1,000)
Vinyl acetate	30(10)

(a) Concentrations in parentheses are in grains per standard cubic foot.
(b) Not detectable.

*The only specific operation designated at present in this category is the manufacture of phenol. (In this process toluene is oxidized to benzoic acid with a catalyst containing cobalt salts in a reactor. The benzoic acid is then oxidized to phenol at a higher temperature, using a catalyst containing copper salts in a second reactor.)

IV. EMISSION STANDARDS FOR THE PETROCHEMICAL INDUSTRY (CONTD)

Inert gases, separated from the benzoic acid and phenol, are vented to the atmosphere.

The major problem arises from the various chemical constituents which create a nuisance odour problem for the surrounding community. Inerts or other waste gas streams should be collected and incinerated in an afterburner.

The process also produces a tarry sludge which is usually burned in the steam plant. Emissions from this source will contain copper and cobalt in the particulate matter.

V. EMISSION STANDARDS FOR MISCELLANEOUS INDUSTRIES (FOR INDUSTRIES AND FACILITIES OTHER THAN THOSE COVERED IN SECTIONS II-IV)

A. Specific Standards

Maximum Emission Rates or Concentrations:

Total Particulates, gr/scf - 0.10
Hydrocarbons as methane (CH_4), ppm (V) - 150
Odor - No objectionable odor outside the plant boundary
Monomethylamine, ppM (V) - 10
*SO_2 (excluding power boilers), ppm(V) - 250
NO_2, ppm (V) - 600
Pb, gr/SCF - 0.003
Cd, gr/SCF - 0.003
As, gr/SCF - 0.003
Hg, gr/SCF - 0.003
Zn, gr/SCF - 0.003
From Sulfuric Acid Plants:
  SO_2, lb/T 100% acid - 3.0
  SO_3, gr/SCF - 0.011

*Option I of 2 options for SO_2 control is shown. Option II may be applied only to plants where 80% or more of the sulphur input to the plant is recovered (annual average). Under II it is recommended that new operations meet the conditions listed below for existing plants and, furthermore, achieve higher levels of control as the technology becomes available. Sulphur dioxide emissions under Option II shall be controlled so that:

1. The annual arithemtic mean at any continuous ambient sensor shall not exceed 0.03 ppm.

BRITISH COLUMBIA AIR REGULATIONS - NEW SOURCES (CONTD)

V. EMISSION STANDARDS FOR MISCELLANEOUS INDUSTRIES (FOR INDUSTRIES AND FACILITIES OTHER THAN THOSE COVERED IN SECTIONS II-IV) (CONTD)

2. The maximum 24-hour concentration at any continuous ambient sensor shall not exceed 0.14 ppm.

3. The maximum 3-hour concentration at any continuous ambient sensor shall not exceed 0.3 ppm.

4. A programme to forecast air pollution potential shall be instituted. Prior to periods of stagnation or high air pollution potential, the quantity of contaminants shall be reduced accordingly:
   - a) When a concentration of 0.3 ppm for a one-hour period is reached at any continuous ambient sensor, sulphur dioxide emissions shall be reduced until a concentration of 0.2 ppm is reached for a one-hour period.
   - b) During periods of stagnation lasting greater than 12 hours, the sulphur dioxide and particulate emissions shall be controlled so as to maintain the Air Pollution Index (API) below 60. The API shall be calculated as follows:
     API = [SO_2 in ppm] [125] + [suspended particulate in g/M^3] [0.25].

BRITISH COLUMBIA SOLID WASTE REGULATIONS - NEW SOURCES

Agency: Department of Lands, Forests, and Water Resources; Pollution Control Branch (Ministry of the Environment)

I. GENERAL

A. Definitions

1. "Garbage" means putrescible refuse, and as defined under "Municipal Refuse" in the Pollution Control Board "Minimum Requirements for Refuse Disposal to Land," dated October 13, 1971, and any other objectives established by the Pollution Control Board for the disposal of municipal-type wastes or garbage.

2. "Hazardous Waste" means waste which, because of its inherent nature and quantity, requires special disposal techniques to avoid creating health hazards, nuisances, or environmental pollution. Hazardous wastes are toxins, corrosives, irritants, strong sensitizers, flammables, explosives, or infectious or condemned foods.

3. "Industrial Refuse" means discarded solid or nonaqueous liquid materials resulting from an industrial process, not including airborne solids in gaseous emissions, nor suspended solid material of low concentration carried in liquid effluents.

4. "Putrescible Waste" means organic matter capable of being decomposed by micro-organisms.

B. Provisions

1. Implementation of Objectives - Recommended Guidelines.

   a) Progressive objective levels have not been specified for the disposal of industrial refuse from the various industries, since disposal at each site will be dependent upon such variables as the volume and characteristics of the waste, site conditions, and other factors. This section does recommend general guidelines for the disposal of specific types of refuse.

   b) It is recommended that, where available and acceptable to the operator of the landfill, refuse and solid waste should be taken to a municipally or regionally operated landfill site.

BRITISH COLUMBIA SOLID WASTE REGULATIONS - NEW SOURCES

II. SPECIFIC DESIGN AND OPERATIONS GUIDELINES AND CRITERIA

A. Landfill Disposal Site-selection Guidelines.

1. From a pollution control standpoint it is suggested that landfill site-selection must primarily be based on hydrogeological factors, soil conditions, surface runoff behaviour, proximity of surface water, and location of domestic or irrigation wells. If these factors indicate potential contamination of ground or surface water, the choice then must be either to find a more suitable site, or to provide means for protection of surface water or adjacent aquifers. It is recommended that a landfill be located such that surface drainage or runoff can be diverted around the fill; such that adequate drainage from the site is ensured; and such that groundwater will not become contaminated as a result of the location and (or) operation of the landfill. Since disposal to land will usually occur on plant property, the choice between a number of suitable locations for a landfill may be limited, and therefore will necessarily be based on consideration of only some site-selection factors.

2. The landfill should be located such that its appearance will not constitute an aesthetic nuisance, no health hazard is created, and influence on wildlife habitat is minimized. Areas which have been filled to the final elevation should be seeded with vegetative cover to prevent erosion or nuisance dust.

3. Where possible, it is preferable that industries make use of regional or municipal disposal facilities.

B. Garbage

Garbage must be disposed of with due regard to the Pollution Control Board "Minimum Requirements for Refuse Disposal to Land," dated October 13, 1971, the Pollution Control Branch "Operational Guidelines for the Discharge of Refuse on Land," dated October 1971, and any other objectives established by the Pollution Control Board for the disposal of municipal-type wastes or garbage.

C. Putrescible Waste

Putrescible waste must be disposed of with due regard to those objectives established for municipal wastes.

II. SPECIFIC DESIGN AND OPERATIONS GUIDELINES AND CRITERIA (CONT)

D. Industrial Refuse - Disposal Methods and Operations

1. Much of the solid wastes generated by industries under consideration can be disposed of in a landfill operation. Preference should always be given, when feasible, to recovery of usable by-products from solid wastes before land disposal.

2. This subsection excludes garbage (see II.B. above).

3. Requirements and guidelines for nonputrescible industrial refuse have also been included in the documents referred to in II. B. and such would normally apply. However, it is recognized that specific conditions may not permit some operations to comply with all aspects of these requirements and guidelines. In such cases, it is recommended that the following be considered, as applicable:

   a) Refuse of a nonputrescible nature, such as that resulting from plant construction, demolition, and maintenance should be deposited in an orderly manner within controlled access areas. Uncontrolled burning should be prohibited. It is recommended that the requirements for compaction, type of cover material, and covering frequency be at the discretion of the Director.

   b) Refuse materials of a special nature (e.g., slag, brine treatment sludges, etc.) may be deposited in an orderly fashion within controlled access areas. It is recommended that the requirements for compaction, where appropriate, and type of cover material and covering frequency, be at the discretion of the Director.

   c) In special cases involving the disposal of materials noted for their specific toxicity characteristics, e.g., content of lead or mercury, the above requirements and guidelines may not be suitable. Specific conditions including refuse composition, location, soil type, topography, and the behaviour of surface and groundwaters must be assessed in determining an acceptable procedure for disposal.

4. Hazardous materials and sludge must be given special consideration; their disposal is discussed in subsections II. G. and II. F, respectively, below.

II. SPECIFIC DESIGN AND OPERATIONS GUIDELINES AND CRITERIA (CONT)

E. Landfill Operations

1. General operational guidelines

   a) The food-processing, agriculturally orientated, and miscellaneous industries should comply with the current guidelines published by the Pollution Control Branch.

   b) Reduction of waste volume before disposal is recommended. On-site volume reduction by compaction will increase the life of the landfill site and minimize hazards and nuisances.

   c) In areas where unexcavated or stockpiled soil is expected to be unworkable due to frozen soil conditions for extended periods, cover shall be placed as late as possible in the fall and as soon as the soil becomes workable in the spring.

2. Landfill levels of operation

   a) There are three levels of landill operation:

      i) Level A operation requires daily covering.

      ii) Level B operation requires covering at least once per seven days of operation.

      iii) Level C operation requires covering at least once per 20 days of operation.

   b) The guidelines for operating a landfill at Levels A, B, and C are shown in Table 1, and depend on the type of refuse and whether the application is new or existing. The guidelines will be used in the issuing of permits for the discharge of wastes to a landfill operation.

BRITISH COLUMBIA SOLID WASTE REGULATIONS - NEW SOURCES

II. SPECIFIC DESIGN AND OPERATIONS GUIDELINES AND CRITERIA (CONT)

TABLE 1

Guidelines for the Level of Landfill Operations

Level of Landfill Operation Type of Waste	A	B	C
Inert[1]			X
Hazardous wastes	X		
Any combination of inert, sludge, hazardous, or putrescible waste	X		
Putrescible[2]			

1. Inert waste is of the type that degrades or is leached slowly, such as packaging material or construction debris.

2. Putrescible waste is usually organic material of plant or animal origin and its disposal should be consistent with those objectives established for municipal-type wastes.

F. Sludges

Sludges which are acidic or basic should be neutralized prior to discharge. The final pH of the sludge may be dictated by the solubility of the constituents. Sludges should be dewatered as much as possible, and thixotropic sludges mixed with inert fill prior to discharge in order to provide stability.

One technique for the disposal of oily sludges is cultivation into the soil with subsequent decomposition by

II. SPECIFIC DESIGN AND OPERATIONS GUIDELINES AND CRITERIA (CONT)

bacterial action. This method requires considerable area and periodic cultivation to ensure adequate aeration.

Incineration in properly designed equipment is an effective method for the disposal of oily waste.

Biological sludges may be incinerated, cultivated into the soil, or sprayed onto the ground.

G. Hazardous Materials

The hydrogeologic and climatic factors are to be taken into consideration when determining the disposition of hazardous materials in the landfill in relation to groundwater levels.

When hazardous wastes are incorporated into a landfill, the wastes are to be placed at as high an elevation as possible in the fill and spread in thin layers to facilitate absorption into the fill.

Hazardous wastes which can cause damage to the environment or create a health hazard should be given special consideration with regard to the method of disposal in a landfill and the frequency of covering. The fill area shall be covered immediately with at least 6 inches of cover material where such wastes pose a direct hazard to landfill operators or persons using the fill.

A separate record of the quantity, type, and discharge location of all hazardous wastes shall be maintained as required by the Director and submitted to the Director on request.

H. Coal Washplant Refuse

Major releases of effluents and contaminants can occur from coal-wash refuse piles in the form of acid drainage and the products of combustion. Characteristics to be considered in planning for and in depositing of coal refuse include coal rank, presence of mineral sulphides (e.g., pyrite), moisture, void ratio, and specific surface.

II. SPECIFIC DESIGN AND OPERATIONS GUIDELINES AND CRITERIA (CONTD)

The following items are generally recommended as guidelines to be used in planning and operating coal-wash refuse piles:

a) Clear vegetation and overlying organic matter from the refuse-site.

b) Divert surface run-off around the refuse-site and minimize infiltration into the pile.

c) Exclude all extraneous industrial refuse and garbage from the pile.

d) Provide adequate fire prevention and control facilities. It is recommended that burning and the deposition of hot ash or clinker be prohibited on the site.

e) Refuse-sites should be fenced and posted to limit public access.

Other guidelines which should be applied only after careful consideration has been given to the characteristics of the particular refuse are:

f) Spread the material in layers of acceptable thickness and compact to increase density.

g) Seal the outer edges and surface of the pile with a suitable material to prevent the entry of moisture and air.

h) Incorporate intermediate layers of inert material into the pile to provide percolation and ventilation barriers.

i) Maintain the surface of the pile in good condition and suitably graded until the pile has stabilized. Cracks, depressions, test holes, test trenches, and the like, should be promptly filled and sealed.

I. Waste Oils

The most satisfactory method for the disposal of waste lubricating oils is by recycling (refining). Incineration in properly designed equipment is an alternate method when recycling is not practicable.

II. SPECIFIC DESIGN AND OPERATIONS GUIDELINES AND CRITERIA (CONTD)

J. Organic Liquids and Solvents

Recovery of organic liquids and solvents is the preferred treatment. However, where this is not practicable, incineration in properly designed equipment is an alternative.

K. Spent Catalyst and Inert Solid Residue

Petroleum refineries and natural gas treatment plants have a variety of spent catalysts for disposal. Most those which are not economically recoverable are inert and may be used for landfill. Others containing phosphoric acid, for example, require neutralization prior to disposal. Other inert materials, e.g., bauxite mud from the manufacture of alum, may also be used for land fill, provided any free acid or caustic is removed.

L. Hydrated Lime Sludge

The production of acetylene from calcium carbide results in a slurry containing hydrated lime with a very high pH. The lime is preferably recovered for use as a soil conditioner. Other disposal methods must ensure that surface or groundwaters will not be contaminated.

XX. INTERNATIONAL JOINT COMMISSION: GREAT LAKES WATER QUALITY STANDARDS

(The International Joint Comission was established in 1909 by the Boundary Waters Treaty between the United States and Great Britain and is composed of appointees from the United States and Canada.)

I. GENERAL

A. Definitions

1. "Boundary waters of the Great Lakes System" or "boundary waters" means boundary waters, as defined in the Boundary Waters Treaty, that are within the Great Lakes System.

2. "Boundary Waters Treaty" means the Treaty between the United States and Great Britain Relating to Boundary Waters, and Questions Arising Between the United States and Canada, signed at Washington on January 11, 1909.

3. "Great Lakes System" means all of the streams, rivers, lakes and other bodies of water that are within the drainage basin of the St. Lawrence River at or upstream from the point at which this river becomes the international boundary between Canada and the United States.

4. "Harmful quantity" means any quantity of a substance that if discharged into receiving waters would be inconsistent with the achievement of the water quality objectives.

5. "Hazardous polluting substance" means any element of compound identified by the Parties which, when discharged in any quantity into or upon receiving waters or adjoining shorelines, presents an imminent and substantial danger to public health or welfare; for this purpose, "public health or welfare" encompasses all factors affecting the health and welfare of man including but not limited to human health, and the conservation and protection of fish, shellfish, wildlife, public and private property, shorelines and beaches.

6. "State and Provincial Governments" means the Governments of the States of Illinois, Indiana, Michigan, Minnesota, New York, Ohio, Pennsylvania, and Wisconsin, and the Government of the Province of Ontario.

I. GENERAL (CONT)

7. "Tributary waters of the Great Lakes System" or "tributary waters" means all the waters of the Great Lakes System that are not boundary waters.

B. General Requirements

1. Water quality standards and other regulatory requirements of the Parties [United States and Canada] shall be consistent with the achievement of the water quality objectives herein. The Parties shall use their best efforts to ensure that water quality standards and other regulatory requirements of the State and Provincial Governments shall similarly be consistent with the achievement of the water quality objectives.

2. The specific water quality objectives adopted herein represent the minimum desired levels of water quality in the boundary waters of the Great Lakes System and are not intended to preclude establishment of more stringent requirements by the Parties or component jurisdictions.

3. Notwithstanding the adoption of specific water quality objectives, all reasonable and practicable measures shall be taken [in accordance with the applicable creating agreement] to maintain the levels of water quality existing at the effective date of these water quality objectives and regulations in those areas of the boundary waters of the Great Lakes System where such water quality is better than that prescribed by the specific water quality objectives.

4. Provisions of these regulations shall be designed and implemented so as to abate and control pollution of tributary waters where necessary or desirable for the achievement of the water quality objectives for the boundary waters of the Great Lakes System.

5. In areas designated by the appropriate jurisdiction as having outstanding natural resource value and which have water quality better than prescribed by the specific water quality objectives, that water quality shall be maintained or enhanced.

INTERNATIONAL JOINT COMMISSION: GREAT LAKES WATER QUALITY STANDARDS

II. GENERAL WATER QUALITY OBJECTIVES

The boundary waters of the Great Lakes System shall be:

A. Free from substances that enter the waters as a result of human activity and that will settle to form putrescent or otherwise objectionable sludge deposits, or that will adversely affect aquatic life or waterfowl.

B. Free from floating debris, oil, scum and other floating materials entering the waters as a result of human activity in amounts sufficient to be unsightly or deleterious.

C. Free from materials entering the waters as a result of human activity producing color, odor or other conditions in such a degree as to create a nuisance.

D. Free from substances entering the waters as a result of human activity in concentrations that are toxic or harmful to human, animal or aquatic life.

E. Free from nutrients entering the waters as a result of human activity in concentrations that create nuisance growths of aquatic weeds and algae.

III. SPECIFIC WATER QUALITY OBJECTIVES

Applicable to all boundary waters of the Great Lakes System. (Provisions marked by * would be revised by the proposed objectives and standards as in Section IV. herein.)

A. Microbiology Limitations

1. Total coliform bacteria $\leq$ 1000/100 ml

2. Fecal coliform bacteria $\leq$ 200/100 ml

3. Waters used for body contact recreation activities should be substantially free from bacteria, fungi, or viruses that may produce enteric disorders, or eye, ear, nose, throat, and skin infections or other human disease and infections.

III. SPECIFIC WATER QUALITY OBJECTIVES (CONT)

B. Dissolved Oxygen Limitations

1. Connecting channel waters and upper lake waters $\geq$ 6.0 mg/l.

2. Hypolimnetic waters: sufficient dissolved oxygen to support fishlife, particularly cold water species.

C. Total Dissolved Solids Limitations

1. Lake Erie, Lake Ontario and the International Section of the St. Lawrence River: not to exceed 200 mg/l.

2. St. Clair River, Lake St. Clair, Detroit River and the Niagera River: limited to a level consistent with maintaining the limits for Lake Erie and Lake Ontario shown in C.1. above.

3. In the remaining boundary water, pending further study, the level of total dissolved solids should not exceed present levels.

*D. Taste and Odor. Phenols and other objectionable taste and odor producing substances should be substantially absent.

*E. pH Range Allowable 6.7-8.5

*F. Iron $\leq$ 0.3 mg/l

G. Phosphorus

1. Concentrations shall be limited as necessary to prevent nuisance growths of algae, weeds, and slimes that are or may become injurious to any beneficial water use.

2. Waste treatment or control requirements for all industrial plants discharging waste into the Great Lake System shall be designed to achieve maximum practicable reduction of phosphorus discharges to Lake Erie, Lake Ontario and the International Section of the St. Lawrence River.

III. SPECIFIC WATER QUALITY OBJECTIVES (CONT)

H. Radioactivity. Radioactivity should be kept at the lowest practicable levels and in any event controlled to the extent necessary to prevent harmful effects on health.

I. The following shall be interim objectives until such objectives are further refined.

*1. Temperature. There shall be no change that would adversely affect any local or general use of the applicable waters.

*2. Mercury and other toxic heavy metals. The waters shall be free of concentrations of these substances that are toxic or harmful to human, animal or aquatic life.

3. Persistent organic contaminants. Persistent organic contaminants, including pest control products, that are toxic or harmful to human, animal or aquatic life should be sustantially absent in the waters.

*4. Settleable and suspended materials. Waters shall be free from substances that will settle to form putrescent or otherwise objectionable sludge deposits, or that will adversely affect aquatic life or waterfowl.

*5. Oil, petrochemicals, and immiscible substances. Waters should be free from floating debris, oil, scum and other floating materials in amounts sufficient to be unsightly or deleterious.

INTERNATIONAL JOINT COMMISSION: GREAT LAKES WATER QUALITY STANDARDS

IV. PROPOSED SPECIFIC WATER QUALITY OBJECTIVES FOR THE GREAT LAKE SYSTEM (NEW OR REVISED)

A. Metal Contaminants

The following metal contaminants shall not exceed the concentrations specified.

Contaminant (total)	Concentration
Arsenic	50 μg/l
Cadmium	0.2 μg/l
Chromium	50 μg/l
Copper	5 μg/l
Iron	300 μg/l
Lead	10 μg/l-Lake Superior
	20 μg/l-Lake Huron
	25 μg/l-other Great Lakes
Mercury	0.2 μg/l in waters
	0.5 μg per gram in fish (wet weight basis)
Nickel	25 μg/l
Selenium	10 μg/l
Silver	0.1 μg/l
Zinc	30 μg/l

B. The following inorganic contaminants shall not exceed the concentrations specified:

Contaminant	Concentration
Fluoride	1.2 mg/l
NH_3	0.020 mg/l, un-ionized NH_3
	0.5 mg/l, total NH_3
H_2S	0.002 mg/l, undissociated H_2S, at any time
Chlorine	0.002 mg/l, residual chlorine (using amperometric or equivalent method)

C. The following organic contaminants shall not exceed the concentrations specified:

Cyanide	5 μg/l

IV. PROPOSED SPECIFIC WATER QUALITY OBJECTIVES FOR THE GREAT LAKE SYSTEM (NEW OR REVISED) (CONT)

Oil and Petrochemicals.
Oil and petrochemicals should not be present in concentrations that:

1) Can be detected as visible film, sheen or discoloration on the surface.
2) Can be detected by odor.
3) Can cause tainting of fish or edible invertebrates.
4) Can form deposits on shorelines and bottom sediments that are detectable by sight or odor, or deleterious to resident aquatic organisms.

D. Unspecified Non-Persistent Toxic Substances and Complex Effluents

These substances shall not be present in concentrations exceeding 0.05 of the median lethal concentration (96 hr LC50) for any sensitive local species (to protect aquatic life).

E. Other Properties and Physical Characteristics

1. pH range 6.5-9.0
Discharges shall not change the pH at the boundary of the designated mixing zone more than 0.5 units from the ambient.

2. Tainting substances (including taste and odor)

   a) Raw public water supply sources should be essentially free from objectionable taste and odor for aesthetic reasons.
   b) Substances entering the waters as a result of human activity that cause tainting of edible aquatic organisms should not be present in concentrations which will lower the acceptability of these organisms as determined by organoleptic tests.

3. Settleable and suspended solids and light transmission

For the protection of aquatic life, waters should

IV. PROPOSED SPECIFIC WATER QUALITY OBJECTIVES FOR THE GREAT LAKE SYSTEM (NEW OR REVISED) (CONT)

be free from substances that will settle to form putrescent or otherwise objectionable sludge deposits or that will alter the value of the Secchi disk depth by more than 10 percent.

4. Asbestos. Asbestos shall be kept at the lowest practicable levels and controlled to the extent necessary to prevent harmful effects to health.

5. Temperature

a) Thermal additions to receiving waters or a designated segment thereof should be such that thermal stratification and subsequent turnover dates are not altered from those existing prior to addition of heat from artificial origin.

Maximum weekly average temperature (MWAT). This is the mathematical mean of multiple, equally spaced daily temperatures. [Considerable temperature data on various fish species is available in International Joint Commission Publications.]

For Growth--
The maximum weekly average temperature (MWAT) in the zone inhabited by the species at that time should not exceed one-third of the range between the optimum temperature (To) and the upper ultimate incipient lethal temperature (Tu) of the species, in order to maintain growth of aquatic organisms at levels necessary for sustaining actively growing and reproducing populations. Therefore, use:

$$\text{MWAT} = \text{To} + \frac{\text{Tu} - \text{To}}{3}$$

The optimum temperature is assumed to be for growth but other physiological optima may be used in the absence of growth data. The MWAT must be applied with adequate understanding of the normal seasonal distribution of the important species.

For Reproduction--
The MWAT reproduction should not exceed those

IV. PROPOSED SPECIFIC WATER QUALITY OBJECTIVES FOR THE GREAT LAKE SYSTEM (NEW OR REVISED) (CONT)

limits for normal spawning; in addition these objectives must protect gonad growth and gamete maturation, spawning migrations, spawning itself timing and synchrony with cyclic food sources, and normal patterns of gradual temperature changes throughout the year. The protection of reproductive activity must take into account normal months during which these processes occur in specific water bodies for which objectives are being developed.

For Winter Survival--
(Applicable at any place inhabitable by fish.) The MWAT for fish survival during winter should not exceed the acclimation, or plume, temperature (minus a 2.0°C safety factor) that raises the lower lethal threshold temperature above the normal ambient water temperature for that season. This temperature limit will apply in any area to which the fish have access and would include areas such as unscreened discharge channels. This objective is necessary to eliminate fish kills caused by rapid changes in temperature due to plant shutdown or movement of fish from a heated plume to ambient temperature.

c) Short-term exposure to extreme temperature.

For the Season of Growth--
The temperature objective for (1) short-term exposure during the growth season is the 24-hr. median tolerance limit, minus 2°C, at an acclimation temperature approximating the MWAT for that month; and (2) short-term exposure during the spawning season is the upper temperature for successful incubation and hatching. These exposures should not be too lengthy or frequent or the species could be adversely affected. The length of time in minutes (t) that 50 percent of a population will survive temperatures above the incipient lethal

IV. PROPOSED SPECIFIC WATER QUALITY OBJECTIVES FOR THE GREAT LAKE SYSTEM (NEW OR REVISED) (CONT)

temperature (T in °C) can be calculated from the following equation:

$$\log (t) = a + b (T)$$

where a and b are intercept and slope, respectively, which are characteristics of each acclimation temperature for each species (National Academy of Sciences, 1973).

For the Season of Reproduction--
The short-term maximum temperature for the season of reproduction should be based on the maximum incubation temperature for successful embryo survival. The maximum temperature for spawning is probably an acceptable alternative.

F. Mixing Zones

The responsible regulatory agencies may designate restricted mixing zones in the vicinity of outfalls within which the specific water quality objectives shall not apply. Mixing zones shall not be considered a substitute for adequate treatment or control of discharges at their source.

The following guidelines should be used in the designation of mixing zones:

1. A mixing zone is an area, contiguous to a point source, where exceptions to water quality objectives and conditions otherwise applicable to the receiving waterbody may be granted.

2. Specific water quality objectives and conditions applicable to the receiving waterbody should be met at the boundary of mixing zones.

3. Limitations on mixing zones should be established by the responsible regulatory agency on a case-by-case basis, where "case" refers to both local considerations and the waterbody as a whole, or segment of the waterbody.

IV. PROPOSED SPECIFIC WATER QUALITY OBJECTIVES FOR THE GREAT LAKE SYSTEM (NEW OR REVISED) (CONT)

4. Mixing zones, by definition, represent a loss of value.

5. Many of the general water quality objectives should apply to discharge-related materials within mixing zones. The zones should be free of: objectionable deposits; unsightly or deleterious amounts of flotsam, debris, oil scum and other floating matter; substances producing objectionable color, odor, taste, or turbidity and substances and conditions or combinations thereof at levels which produce aquatic life in nuisance quantities that interfere with other uses.

6. No conditions within the mixing zone should be permitted which are either (a) rapidly lethal to important aquatic life (conditions which result in sudden fish kills and mortality of organisms passing through the mixing zone); or (b) which cause irreversible responses which could result in detrimental post-exposure effects; or (c) which result in bioconcentration of toxic materials which are harmful to the organism or its consumers.

7. Concentrations of toxic materials at any point in the mixing zone where important species are physically capable of residing should not exceed the 24 to 90-hour LC50.

8. When designing conditions to protect specific organisms it is necessary to know that the organisms would normally inhabit the area within the mixing zone. Zones of passage should be assured either by location or design of conditions within mixing zones. Mixing zones should not form a barrier to migratory routes of aquatic species or interfere with biological communities or populations of important species, to a degree which is damaging to the ecosystem, or diminish other beneficial uses disproportionately.

9. Mixing zones may overlap unless the combined effects exceed the conditions set forth in other guidelines.

IV. PROPOSED SPECIFIC WATER QUALITY OBJECTIVES FOR THE GREAT LAKE SYSTEM (NEW OR REVISED) (CONT)

10. Municipal and other water supply intakes and recreational areas should not be in mixing zones as a general condition, but local knowledge of the effluent characteristics and the type of discharge associated with the zone could allow such a mixture of uses.

11. Areas of extraordinary value may be designated off-limits for mixing zones.

12. The size, shape and exact location of a mixing zone should be specified so that both the discharger and the regulatory agency know the bounds.

13. Existing biological, chemical, physical and hydrological conditions should be known when considering location of a new mixing zone or limitations on an existing one.